PLANTING YOUR OWN BROADLEAF WOOD

… everything you need to know

We have co-ordinated a wide range of information as a step by step guide to help anyone interested in planting a new broadleaf wood, from woodland design and planting techniques through to typical costs, maintenance, some advice on native tree species, their preferred locations and the trees that will suit different conditions. We hope it will give you a better understanding of the various aspects that should be considered .

The Woodland Trust is one source of help and advice for would-be tree planters, but there are others. Many local authorities have tree and woodland officers, the Wildlife Trusts are excellent sources of conservation information and experience and of course there is the Forestry Commission (FC). The FC also offers a range of grants and they manage the overall landscape of woodland management for the government – so it is an excellent resource. The FC also implements European legislation as it affects woodlands – for example areas such as the EIA (Environmental Impact Assessment) process.

Creating woodland should be fun and exciting – but there are lots of things you need to think about from "why" you want to plant a wood to "where" you plant and then "how" you go about it. The following list represents a helpful guide, covering;

- **Objectives**
- **Site assessment**
- **Which species do I want?**
- **How do I establish my trees?**
- **How do I get trees in the ground?**
- **After-purchase care**
- **Site design**
- **Spacing and stocking densities**
- **Tree protection**
- **Maintenance and establishment**
- **Five years onward**
- **Tree planting organisations and publications**
- **Native tree characteristics (Appendix 1)**
- **Native shrubs characteristics (Appendix 2)**
- **Choosing trees for different soils and locations (Appendix 3)**

1. Objectives

It is important to be clear about your objectives from the beginning, as this will help you to choose the type of feature, location, tree species and the level of involvement of other people.

For example do you wish to plant trees to increase the range of plants and animals – the biodiversity – of the area? Perhaps your interest is to create fruit trees, a woodland garden, provide shelter for stock, to screen off a poor view, or create a timber or wood fuel resource? The Trust commonly plants trees to enhance the landscape, provide areas for public recreation, and to improve biodiversity. We are also working with landowners on schemes to improve water percolation (reduce flood risk), clean water and absorb airborne

pollutants. In short, understand your own motives and it will help you chose the right prescriptions for your woodland.

Remember it may not be possible to cover every objective on one site, but here are some possibilities to consider:

• Hedges can screen or protect boundaries while providing corridors for wildlife and softening harsh environments.
• Single trees and clumps can form features in the centre of grassy open areas. Eventually they will develop into splendid parkland trees with an open canopy.
• Avenues of trees in open green areas or along road edges will form neighbourhood features of the future.
• Mazes can provide great entertainment for all ages – they should be created from species that retain their leaves in the winter such as yew, beech or hornbeam.
• Living willow features, such as tunnels and huts, can create a fun place for children to play. New growth can be woven into the structure each year and this helps to maintain its shape and strength.
• Woodland is a wonderful place for walking and a rich habitat for birds and other animals. Small trees only a metre high when planted will reach head height and provide a woodland experience in five years.

Food and wood products:

Increasing numbers of people are becoming aware of the need to think about where our power comes from. A huge proportion of our CO_2 output in this country is produced from heating our homes so if we can reduce our use of fossil fuels this would be a great thing environmentally. Would you like to produce a fuel wood crop from your trees? Or perhaps you want to plant for timber or fruit? Consider apples or pears from an orchard, elderberries or sloes to make wine, wood for timber or firewood, willow for craftwork, hazel for bean poles or spruce for Christmas trees. As well as the direct products of woodlands there are other benefits which can be used in the garden, from the shade of a big tree and managing wind through planting wind breaks through to using leaf litter for garden composts.

Once you are clear on the “why” create a wood then it is time to look at the site and see what the site will tell you about what it can sustain.

2. Site assessment

Each and every site has different qualities, from the soils and water resources to aspect and landscape. In addition to this access and proximity to people, buildings and roads will differ too. So you will need to think about how you manage the site as well as what goes into it. Firstly, of course, are there any reasons why you cannot plant a site?

PLANNING PERMISSION - Planning permission is not required to plant trees or create a wood as it is classed as an agricultural activity and there is no change of use. Where planning does affect tree planting is where someone has a condition attached to a planning permission requiring them to plant trees.

ARCHAEOLOGY - you can be prosecuted for damage to protected archaeological features and you should certainly be aware of historical matters affecting your land. Check with the County Council archaeology department whether there are any Scheduled Ancient Monuments or Listed Buildings on the site (old lime kilns are a typical example and may be well hidden by years of vegetation growth) or any other historic features which, as a responsible landowner, you may want to respect.

PIPES AND CABLES – you should be aware of pipes and cables affecting your land. Overhead electric cables are usually obvious and you should not plant trees within (usually) 5m of a cable. Underground cables and pipes are less obvious but you can gain information from the respective utilities companies about the location of their pipes and cables. These days a charge may be levied, but you can argue the case and sometimes notifying the company that you are planting trees in an area can prove helpful!

HABITATS OF VALUE – it is advisable not to plant trees into habitats that have a greater value or potential value for wildlife than the woodland you are creating. It is rare that an ex arable site would fall into this category but if you are planting into grasslands do check that the site has been "improved". Unimproved grasslands (ones grazed over many years but rarely if ever ploughed) as well as wetland or heathland are rare and can be fantastic wildlife resources. If in doubt, seek specialist advice from the local Wildlife Trust or similar organisation.

ENVIRONMENTAL IMPACT ASSESSMENT - For most people they will be planting a small area of woodland or a few trees but for bigger schemes you may be required to carry out an Environmental Impact Assessment (EIA). Generally the threshold for this requirement is 5 ha (12.5 acres) but if you are planting in an area known as an AONB (Area of Outstanding Natural Beauty), Natural Scenic Area or National Park there is a threshold limit for planting of 2 ha (5 acres). The requirement for an EIA can be determined by the relevant Forestry Authority and if you are considering planting a larger area than 2ha it is worth checking with them first. Putting together an EIA can be time consuming and expensive, so it is worth discussing at an early stage as you could be prevented from planting a site at all.

LANDSCAPE - You should also consider how your planting will affect landscape features. Whilst most plantings will not be a problem, trees do obscure views and can cause local issues (such as sight lines next to highways). It is as well to think about the location carefully before proceeding.

RESPONCIBILITIES - We know you will have a lot of pleasure creating and managing your woodland but you should be aware that there are responsibilities in owning land with trees. You should insure your land in case anyone injures themselves. You should also make sure that the land is safe for people to visit (even without your permission) and ensure that boundaries with highways are properly fenced and trees cut back where they could interfere with traffic or sight lines etc. Make sure you have the skills you need to make decisions about land management and / or get help from someone who does have these skills.

Once you have identified constraints – pipes, archaeology etc – and are happy that planting can go ahead then we can start to look at the detail of planting.

3. Which species do I want?

One of the ways we find most effective in determining which species to plant is literally to "go for a walk" .You will find a wide variety of species in your nearest ancient woodlands and hedgerows.
Of course soil type, aspect, altitude and hydrology of a site can all influence species choice. Generally there are trees and shrubs which are found everywhere and it might be worth thinking about getting your woodland started with common species and adding new more specialised ones later. Take advice on suitability from a local tree supplier or local authority tree officer. Remember that some species, for example willow and alder like wet areas, aspen and birch are common on high exposed sites, and oak is found everywhere in the UK as is hazel and hawthorn. The Woodland Trust would prefer to see new woodlands containing native trees as these are best suited to our climate and wildlife. Careful choice of species and planting create interest in colour and habitat all year round.

Local provenance and native trees:

Planting native trees grown from seed of local or regional provenance is a good "home grown" approach wherever possible. Ideally a plant with a more localised provenance has a pattern of flowering and fruiting more in tune with the lifecycles of our native birds and other wildlife and will therefore be of greater benefit. Britain has a very wide variety of habitats and each and every site will have subtleties in its make-up that will suit some species over others. In general a native tree will be better adapted to our circumstances and some plants will be better suited to growing in particular areas. More of an influence on survival rates could be how the plants are treated in the nursery or in transit to site and planting. You could gather seed from a local ancient wood (with the owner's permission), and then grow them in pots or sow directly on site. Nurseries should be able to give you an idea of where their stock is from with a "provenance certificate". We would certainly recommend that at the very least you buy British stock and if you are at all concerned about the answers you are given, use a different nursery.

Colour and flowers:

Many people think that British trees are uniform in colour and flower but there is a huge variation in the forms and colours of trees across the seasons. Some trees have wonderful flowers and berries and can give fantastic colour changes from spring through to autumn and winter. Maples are known for their autumn colours, the dogwoods have beautiful array of greens, reds and yellows as do some of the willow species. The blossom on blackthorn and hawthorn is the back drop to spring and catkins on hazel are a delight early in the year when little else is about.

Putting birch and alder together will give some subtle but elegant changes in dark reds throughout winter and of course the dark green needles of Scots pine provide cover in winter. Consider what effect are you looking for throughout the seasons and also consider bark colour and tree shape.

Size and growth rate:

Generally we do not suggest planting trees of any description near walls and buildings as any tree, large or small, can affect foundations by root action taking moisture out the soil or through blocking drains. If your plot is close to buildings go for smaller trees and larger

shrubs as they are less likely to cause damage – thorn or birch may be suitable. The further a site is from buildings the more freedom you will have with your species choice – assuming you are not blocking views or site lines along highways etc. A large tree – an oak, ash or lime for example – can easily grow to a height of 20m and a span of 15m.....but will take a long time to get that big! In general the quicker the growth rate the shorter the lifespan of a tree – so you may consider planting more of your land with trees of a range of species with a view to taking out some of the faster growing ones in say 15 years time and leaving in the bigger but slower growing trees Remember that trees do need management and they can be cut down.

4. How do I establish my trees?

We have planted millions of trees over the years. Popping a tree or a seed in the ground is always a leap of faith – it is amazing to think that an acorn has enough genetic material and "umph" to create a tree with branches that can reach over 60 feet high and 45 feet wide! To ensure the best take of trees we first ensure that the ground conditions are as good as they can be and then consider how to establish the trees. We have followed three main establishment approaches at different times using natural colonisation, direct seeding and using transplanted stock from nurseries (the most common approach).

Ground preparation:

Different tree varieties require different ground conditions and good ground preparation prior to planting can improve the success rate of plantations and reduce the need for maintenance and replacement. If you were planting a single tree then you might dig a bigger hole than you need, turn over the soil aerating it as you go, mix in some compost, break up soil lumps, place the tree in the hole and gently re-add the soil, tamping it down as you go. Planting 1,000 like this would improve their survival rate.....but would certainly not improve yours! So:

Trees require a suitable soil substrate, water, light and nutrients to grow. The ground can be prepared to improve soil drainage and structure and to decrease competition for light, water and nutrients from other plants. It is particularly important where the soil is compacted and drainage is poor that it is broken up before planting. Where a dense and / or high grass sward exists, tree growth and survival rates will be reduced through competition for resources. Shade will hold back young trees – often hedgerow plants are put in next to big trees in the winter also which then, in summer, cast a dense shade.

PLOUGHED LAND – If you are able to plant into a ploughed field you may get very good results from most of your transplants as they will benefit from the aerated and freer draining soil. However, you may also need to "rip" the field first to break up a deep plough pan (if a field has been ploughed for many years at one depth it can create an almost impervious barrier which needs to be broken down, known as a plough pan). If you are ploughing before planting you will also need to think about planting grass or wildflower seeds as well as your trees (ask us about our "Forest of Flowers project") A ploughed field will need to have some cover otherwise you risk losing soils to erosion and large numbers of weeds coming in.

PLANTING IN A GRASS MEADOW – when you are planting directly into a grass paddock or field you may need to ensure that the ground is not too compacted (preventing tree roots from getting down into the soil). Two methods are commonly used to open up soils:

• **Ripping** can be a useful method for large areas. It breaks up densely compacted soils but be aware it can break up land drains and unearth services.
• **Mounding** is often used on wetter sites and can reduce weed competition in the first year. A mound of soil is created using a digger and the tree planted into this. This is often used in poorly drained areas but equally there may be a danger of the pile of soil becoming too dry and the roots drying out too much in the sun.

On sites which have been fertilised regularly and planted with aggressive grass species it is not uncommon to have a very **dense grass sward** which not only makes planting difficult but which also competes very heavily with the young trees. Mowing prior to planting will make the job easier but mowing does stimulate growth so the resultant more rapid growth can increase the competition for nutrients and water. Mowing a wavy row for planting or spot strimming is preferable to cutting the whole site.

An alternative is **Spot spraying** with herbicide prior to planting. It removes all competition for light, nutrients and water, and allows the tree to be planted more easily into the ground, while mowing only removes competition for light but makes planting simpler. Spraying the whole site may be less effort, but a dead, brown area is particularly unattractive and the overuse of chemicals is to be avoided.

It is particularly difficult to establish trees in areas of bracken, laurel or rhododendron growth. Commonly the soils which favour these species are acid in nature but these plants exacerbate the problems by leaving noxious chemicals in the soil. In this situation tree establishment may take longer and be more frustrating! However, consider dealing with the vegetation first before planting trees - removing rhododendron and laurel or rolling / spraying bracken to reduce its vigour.

5. How do I get trees in the ground?

Natural colonisation:

Using nature and allowing it to “do its thing” is cheap, cheerful and appropriate for some sites. An area of land with a tree seed source in a hedgerow or wood nearby, if left, will become woodland. Nature is rarely quick but she gets the job done and in a delightfully haphazard and very natural way! If you have time this can be a lovely approach and one we use commonly on parts of sites where there is a seed source and we can afford to wait. Not all sites or situations will lend themselves to this process and you may end up, as we do, planting some of a site with plants from a nursery but letting nature do the rest.

The **advantages** of natural colonisation include; the lower cost of establishment, a guaranteed local origin of seed, the eventual random spacing of trees which are strong rooted and hardy and a very natural look to a site.

The **disadvantages** include, slower establishment rates, the possible limited variety of species for a long time (although there is nothing to stop you throwing in a few fruit trees or other species to augment the natural cycle). Also the trees may not produce quality timber, if this is important to you. Added to this, woodland creation grants from the FC often require active management and the planting of new trees.

A possible compromise with a suitable site could be a combination of tree planting and natural colonisation if the conditions are favourable, for example adjacent to existing ancient woodland. At Wheeldon Copse in Cheshire the Trust planted the core of the site and allowed nature to take its course around the edges where it abutted other woodland.

Direct Seeding:

Good preparation of the seed bed will provide you with a good start point – any soil compaction or plough pan should ideally be broken up and a fine "tilth" set before seeding. Direct seeding can also work in meadows but reducing the competition of grasses is essential first – take a hay crop or two first without adding any fertiliser and then scarify (rake to expose bare areas) the site (to give a chance for tree seeds to get in contact with the soil.

Seeds can either be broadcast generally or drilled in lines. Larger seeds, such as oak, tend to be drilled, as they need to be sown to a greater depth, approximately 10cm. Smaller seeds are usually sown at a depth of 2cm. Soil type will affect depth too, seeds generally need to be sown deeper in light soils and shallower in heavy ones. Tree seeding can take place either in autumn or spring, however autumn may be preferable to give the seeds a chance to break their dormancy through the cold winter period – some seeds need to be frozen to open up the hard outer casing.

Of course "direct seeding" is how nature does it although in a different way. If you can afford to wait then you may try a series of seeding events over several years and the end result may be a richer more diverse and natural looking woodland. Certainly do not worry if trees end up being very close to each other, or a long way apart. It will look very natural.

Predation is worth thinking about. Do you have badgers near by for instance, deer, squirrels, or an abundance of mice, any of which might need consideration.

Planting Nursery Grown Stock:

This is of course is the usual way we create woods as it gives certainty to the process and ensures that you can get the trees to the right density and very quickly assess success in planting establishment. But it does cost more than the other two methods. Most nurseries will charge quite a lot for one tree but if you are able to buy 1000 or more the costs will reduce markedly per tree - but the cheapest trees are not necessarily the best! Find a nursery that grows its own stock and, if you can, go and have a look at where the trees are grown – not only is this interesting in itself but it will give you a good idea of what to expect when you buy trees over the phone or online. You can and should specify that the trees you order are from UK seed sources and, ideally, from a regional source. Some nurseries will allow you to order say 1000 trees but provide you with 200 at a time....if you are planting your own wood and want to do it over several weekends this could be an advantage. Once stock is removed from the nursery it should go back in the ground sooner rather than later.

Choosing the size of your trees is important and will affect your costs, how you manage them on site and their survival rate. Generally speaking we plant smaller trees (40/60 cm or 60/90 cm) as their survival rates are much better than bigger trees – the stress of replanting a larger tree is greater on the plant and losses rise in proportion to the age and size of the

transplant. Have a look at all those publicly funded urban or road schemes – for every large tree that goes in there is a very high chance it will not make it or that it grows very slowly for years before settling in! Smaller trees are also easier to transport and plant – but equally if they are not marked in some way small trees can get lost under grass or bracken. Be aware that an oak at 18 months old can be much smaller than a willow, alder or ash of the same age, so do not be put off by species diversity. Our experience shows that in planting sites some of the first trees to show substantial growth are ash, cherry, willow and alder.

6. After Purchase Care

Storage:

- Leave them in the bags there were sold you in until you need them.
- Keep them cool and moist before planting – store them in cool surroundings out of sunlight such as a shed or garage, spray the roots with a fine mist spray of water if they appear dry.
- Keep out of frost.
- Avoid dropping the bags or dropping things on the bags and don't throw them around – root damage will severely limit growth.

When you are ready to plant:

- Don't try planting on a frosty day if you can help it.
- Carefully carry the bags to site.
- Carefully untie the trees –which are likely to be tied together on groups – from each other without damaging the bark.
- Only take trees out of the bags as you are ready to plant them – root drying will seriously affect a tree's survival rate and even a light wind can dry roots out within a few minutes.

Planting:

Tree planting is traditionally carried out between October and March – avoiding, if you can, frost and snow! When the trees arrive they may need to be stored before use, so ensure their roots do not dry out or are affected by frost. They can be 'heeled in' (stuck in bundles in a soil bed at sufficient depth to prevent frost damage to the roots) or kept in a bag stored in a cool place. Before starting to plant it is useful to mark out the positions of each tree especially if you are organising a community planting event. If canes or stakes are to be used to support the trees these can be used as markers. Alternatively, all the holes required can be dug before planting commences.

It is vitally important to ensure that bare-rooted trees are not exposed to the drying effects of wind and air. The protective bag or wrapping around the roots should be retained until the tree is transferred into a prepared hole. Trees that have been heeled-in should be returned to a protective wrapper before moving them to and around the site.
There are several ways of planting trees, with different techniques being used depending on size. Pit planting is recommended especially for the larger trees, although it is more time consuming than other methods.

A pit or hole should be dug which is several centimetres wider and deeper than the fully extended roots of the tree to be planted. If planting into a dense sward, the turf should

be dug up and set aside. The bottom and sides of the hole should be loosened with a fork or spade, especially in hard or wet ground. The tree should be held in the hole, allowing its roots to spread out evenly and freely, with its root collar level with the ground surface. The earth can then be returned to the hole, topsoil first and while keeping the tree upright, ensuring that all the spaces around the roots are filled.

Press down each layer of soil as the hole is filled, using hands or feet, until the tree is firm and the hole completely filled to the original ground level. If the turf has been reserved, this can now be cut in half, and each piece placed upside down around the stem and firmed into the soil. This provides a basic mulch as the turf rots down and gives a weed-free area immediately around the tree.

Container or cell-grown trees are less likely to dry out than bare-rooted ones if the root-ball is exposed for short periods, but prior to planting they should nonetheless be stored in a sheltered position away from strong sunlight and kept well watered. A hole at least twice the diameter and half as deep again as the root-ball should be dug and treated as for bare-rooted trees. Before planting, and even if a biodegradable pot has been used, the container should be removed and the roots within the ball teased out with the fingers. This encourages the roots to grow outwards, into the surrounding soil.

With larger trees it is even more important to prevent drying out of the roots, loosen the sides and base of the hole, add compost if required with the backfill and ensure that the returned earth fills the hole completely so that the tree is as firm as possible. Damaged and dead branches in the crown are best pruned at this stage. Remember too that no planting should be carried out when the ground is frozen or waterlogged, as it will damage the roots.

7. Site design – Number of trees and distribution:

Some of the following points assume you are buying trees at a nursery (which most people will do). Here are some of the specific issues you should consider at the design stage:

- In a woodland setting, single species are best planted in groups of perhaps 9 to 21+ trees, blending edges into the next group. This will look natural and emulate natural processes. Try to avoid unnatural, geometric patterns and don't try and mix too many species as they can be difficult to manage. Once trees get beyond five years in age they will start to touch each other and shade out the grasses below – it is not long before you can consider thinning these groups out (cutting the odd tree down) and your single species groups will begin to reduce in number.
- Straight lines of trees are easier to maintain in the short-term but can look regimented, planting in wavy lines can reduce this formal appearance. We always plant with a wavy line and contractors now have a greater understanding of "conservation" goals. Trees will thin themselves over time, if left to their own devices, and will develop a more natural pattern. You can perhaps aid this process by thinning or restructuring during the maintenance period.
- Scalloped woodland edges blend more naturally into the landscape and the edges themselves are important wildlife habitats.
- Remember how wide a tree or hedge will grow. Where you plant that tiny twig in an open field could be the centre of a 15-metre diameter mature parkland tree or a one or two-metre-wide hedge. Bear this in mind when planting beside roads, boundaries or paths.

- Open space can be important for wildlife, landscape and recreation. You could create a wildflower rich meadow in your open space but do remember it will have to be maintained. Bees are really under pressure at the moment and anything you can do create habitats rich with nectar the better!
- Blackthorn, holly, gorse and hawthorn provide effective natural barriers, such as at path intersections or on the outside of bends to guide and deflect walkers or for security.
- Shrubs and smaller trees planted along paths and boundaries will give a wood a more diverse and colourful appearance, as well as providing a graded edge that more closely mimics natural woodland.
- Large, standard, specimen trees can be planted sparingly to accentuate viewpoints and create early structure and impact in a newly planted wood. But remember the smaller trees will eventually become the same size.
- All sites need good access for management. So, design good access for maintenance vehicles. For large sites, consider laying out a network of rides for timber extraction if appropriate. Also think about not planting right up to the edge of your land around gates and styles.
- Woodland ground flora can be a spectacular sight in springtime. Ancient semi-natural woodland supports a rich community of wild flowers, mosses, lichens and fungi. It is not possible to re-create this natural diversity, and in many cases you are likely to be starting with a bare area of grass with your newly planted whips poking out of the ground.
- Plants will also colonise from surrounding hedges or be transported by animals, but many prefer shade and will not appear until the canopy has closed. Wild flowers can also be introduced as seed or small plants (plugs). You could do worse than talk to a charity called Landlife who specialise in wild flowers – they will have native species seeds and bulbs that you can buy to add to your plantation.

Leaf drop:

Using leaves wisely can add a lot to soil productivity but equally it is wise not to plant trees that drop large amounts of leaves too close to small ponds or neighbouring properties. A pond will suffer badly from leaf drop build up, eventually becoming so acid that it will no longer support a range of wildlife. Uses leaves positively for composting!

8. Spacing and stocking densities:

The Woodland Trust does not plant many specimen trees as we tend to create native woodland mixes and situations on larger areas. However on the edge of an extended garden woodland you may favour a more formal setting. Once you have determined your species, work out how far apart you want the trees to be when mature. Then decide whether to plant the exact number required or a group that will be thinned in the future while retaining the healthiest individuals. If you are fascinated by avenues go and see the National Trust property at Clumber Park in Nottinghamshire – if lime is your thing this property has probably the ultimate in avenues!

To create a hedge, plant trees in a staggered double row 50cm apart and each row approximately 45cm from the other. A good hedge for laying will include mainly hawthorn and blackthorn in the mix but you can also include occasional trees which can be left uncut (oak, ash, cherry, rowan) or species which give variety in flowering and habitat

(Guelder rose, wild rose, spindle). Hazel and ash will lie in a hedge but do not give the same stock control as the thorns.

To create any wood, the size and the planting density of the trees will depend on whether you want instant impact or slow evolution and whether you are looking at timber production or wildlife as your start point. We have used a range of planting densities depending on site situation and character and also the various grant regimes. Some standard densities are often quoted as follows; the denser rates are rarely used except in tight locations where management is less likely (e.g. on road schemes):

- Planted every 3 metres 1,111 trees per hectare
- Planted every 2.5 metres 1,600 trees per hectare
- Planted every 2 metres 2,500 trees per hectare
- Planted every 1.5 metres 4,444 trees per hectare
- Planted every 1 metre 10,000 trees per hectare

High stocking rates can be used to speed up the canopy closure and gain 'control' of a site more rapidly, especially on weedy sites to keep down maintenance costs or where rabbits may cause high losses. One to two year-old trees (40–100cm) planted at 2–2.5 metre spacing is the most common 'formula' providing reasonably rapid canopy closure. Older, taller trees will cost disproportionately more, grow more slowly when first transplanted and have a lower survival rate.

9. Tree Protection – Fencing and Guards:

You will have seen those fields and meadows which overnight seem to sprout lime green plastic tubes with stakes – the classic "tree tube", hated by some but really useful to aid tree establishment. Tree protection is important for many reasons but not least because young trees are extremely palatable to all types of grazing animals. Where sites that have been grazed for many years are suddenly planted with trees, and the grass no longer cut, vole and mice numbers can soar and they too can damage young trees by ring barking. Hare will munch the leaders out of young trees too – a very obvious angled cut at the top of the tree by sharp teeth. Even mature trees can be ring-barked by stock, especially cattle or horses.

So how you protect newly planted trees must be considered before planting commences. If left until after the trees are in position, the damage may occur before action can be taken. Protection against grazing stock, deer, rabbits and voles is essential if any or all of these animals are present. Protection against other adverse factors, such as wind, people and damaging machinery may be necessary....but perhaps less predictable!

Where stock grazing occurs on a site adjacent to your planting scheme a fence is probably essential to secure the safety of your trees – for any size of planting area fences are a good way of delineating planting zones and keeping out stock. In addition to fences individual stock-proof guards are also often used as either a back up to the fence or the first line of defence against damage from other animals such as rabbits, hare and deer.

For large areas (generally anything more than 3 hectares) it is sometimes cheaper to use fencing, rather than individual tree protection. Tree-planted areas can also be fenced to delineate planting areas or discourage pedestrian access. If fencing is appropriate, consider its impact on the landscape and what you are trying to keep out. Most stock is controlled by standard fencing but keeping this in good repair and tightly strained is

essential if you want to keep out stock – and sheep and lambs are wonderful escapologists. Deer fencing can be expensive (over twice the price per metre) but will be necessary for some plantations and at 2m in height it can be a landscape issue. For a nice "rural" look you can use chestnut paling fences as this looks rustic and will use more natural materials (and support cottage industries) it can also discourage pedestrian use. Standard stock-netting will exclude larger animals and pedestrians. Rabbit proofing a site requires much smaller gauge wire that must be buried below ground. We would suggest that trees are not planted within 2m of the fence line to give you access for repairs and space to cut back branches in due course. Existing trees on a site should never be used as makeshift fence posts. In some circumstances planning permission may be needed for fences and you should check with your local authority if in doubt.

Individual guards come in many types and sizes and can be used singly or en masse. The most significant protection afforded to single trees is often where they are being established in parkland settings. Stakes and tubes in this setting are readily knocked over by cattle and can become the targets for back scratching by animals. A wire mesh supported by three or more stakes supporting each other is often used. More commonly stock is excluded from the planting area and guards need to have less individual strength and provided they obscure the tree from the reach of a passing grazier and are adequate to withstand wind and weather they will work to secure the tree or shrub until established.

Guards start as small as simple tube "vole" guards and move up through different styles and sizes to 1.8m "deer tubes". All species of deer can be a problem for tree establishment and the larger red, roe and fallow deer can jump substantial fences. The bigger guards need staking separately from the tree but small guards merely act as an outer skin to the tree and are not staked. The Trust tends to use guards of a minimum height of 0.6m, and where hare are found 0.75m. However high your guards are, remember that if you live in an area prone to snow, animals can take advantage of the extra height given to them by a snow fall to nip off buds! The smaller guards are often either solid tubes or wrap around "spiral guards" – the solid tubes can be quicker to fit (with the right size and shaped tree) and the spiral guards can flex more with the tree as it grows.

When fitting it may be necessary to prune dead or damaged branches with sharp, clean secateurs. Guards should be checked occasionally to ensure that they have not been displaced. As the trees grow the guards may impair bark growth and should be inspected at least annually and eventually removed altogether once the tree is well established. Some types of guards are supposed to biodegrade and others are re-usable. The Trust re-uses as many guards as it can to save money and plastic. Remember that any new fencing or guards will need to be regularly checked to make sure they are working. You may feel some browsing by deer is not a problem if under control. If in doubt seek specialist advice, which is readily available.

Exposed sites can suffer from wind damage to tubes and trees alike and strong winds can cause newly planted trees to blow over and be damaged. Tree tubes can exacerbate this problem if not properly staked. If your site is very exposed yet suffers from deer problems, it may be worth looking for specialist advice on establishment. Planting small trees with short guards will help – but deer damage may occur at an unacceptable level.

Recent research has revealed that tree roots grow more rapidly and provide a firmer base for the stem if the tree is subjected to a certain amount of wind-induced movement. Avoiding staking any tree may therefore provide for better root growth and fixing (although

this may be unavoidable if you have deer or stock). If you feel you have to stake a tree use a loose tie, allowing flexibility of the stem and crown, as it is preferable to a tie fixing the tree stem firmly to the stake. Several loose turns of string are ideal. Alternatively, a very short stake tied firmly to the tree about 30cm (1ft) above the ground will hold the tree firm but allow some stem movement. Ties and stakes should be checked regularly to ensure that they are effective and, most importantly, not so tight that they affect stem growth. They can normally be removed after, at most, three seasons, and can often be re-used.

If trees are to be planted in a location where they may be accidentally damaged, by people or machinery for example, they should be protected by some form of barrier, or at least made visible so that they can be avoided. The position of trees planted on verges, in hedgerows or alongside arable fields can be indicated by conspicuous stakes to avoid damage from machinery.

10. Maintenance and Establishment:

It is inevitable that some trees will die, but we can try and minimise those losses with care and it is prudent to consider the maintenance of the whole area at the design stage – and that might include watering trees if the summer after planting is hot and dry. Who will maintain the trees, any tree protection, paths and visitor features – will it be you, a community group or a contractor?

The first five years are crucial for establishing the trees themselves. During this period they are most vulnerable to competition for light, nutrients and water, and provide the juiciest and most tender meal for animals. After this time the canopy will shade the ground, reducing competition from other plants and the tree stems will have become less susceptible to pest damage.

Trees may die for many reasons – poor nursery stock, root damage pre or during planting, drought or pest damage for example. You need to decide what percentage loss you are willing to accept before replacing trees. If you have gained funding for your scheme there may be limits agreed within a contract. Replacing trees that have died in the first few years after planting is called “Beating Up” and this can be built into a five-year creation and maintenance contract as a percentage replacement per year. For example five per cent per year. This encourages the contractor or whoever plants the trees to do a good job and ensure they are well maintained.

When designing your public access and open space features, keep your plan simple so that maintenance is minimised. Choose robust features or ones that are cheap to replace or a combination of both. Areas of land previously managed for agriculture can tend towards weeds if you are not careful and open ground can be much more expensive to maintain than you think if you wish to keep it under control. Creeping thistle and ragwort can be serious problems for neighbours (if not controlled and allowed to seed) and most owners of horses do not like dandelion or buttercup in their grazing fields.

Weeding:

Weeding a plantation is something of a misnomer as there are two main reasons for “weeding”. One is to reduce the incidence of weeds likely to affect you or your neighbour whether this is ragwort, creeping thistle, docks or another acknowledged agricultural weed. The other is to promote the growth of the tree by reducing competition. Noxious weeds

such as ragwort, thistles, dock and giant hogweed are noticeable weeds that you have a duty to control adjacent to agricultural land. Where they are likely to occur, try a higher planting density to achieve a faster canopy closure as they may require chemical treatment until they can be controlled naturally. Chemical applications can be used to reduce the arable weeds. In many cases however you can reduce weeds and weeding costs by taking a spade for a walk and chopping off the top part of the plant. With the deep rooted plants this may not kill them but successive “choppings” will leave the plants weakened and will avoid allowing them to go to seed.

The other sort of weeding – to promote growth – is backed up by research which shows clearly that to maintain a weed / grass free ring of 1m diameter around young trees for the first three years of their growth reduces the competition for light, nutrients and water and therefore enhances the tree’s growth rate and chance of survival. A weed / grass-free ring can be created in a number of ways including fitting a mulch mat at planting, chemical application, mulching with materials such as straw after planting and / or physical weeding. Physical weeding by hand or strimmer is the least effective method and merely cutting grass will stimulate the grass to grow.....hardly the point of the exercise!

Chemical weeding and mulching reduce the competition for light, nutrients and water. The choice between chemical application and mulching is one of time and environmental impact. If a contractor is employed, chemical weeding will be the cheaper option as it takes less time. Chemical applications can be made by spring / summer applications by spray or winter applications of granules but should only be carried out by trained individuals. Depending on weed / grass growth chemical applications may be needed once or twice a year. Ensure that only chemicals thought to cause minimum long-term damage to the environment are used. Mulching can be carried out by people with a minimum of training, and the weed-free ring can be created using a thick layer of bark chips, squares of carpet, mulch mats, grass cuttings or straw bales cut in two which we have recently found effective. It can also be an enjoyable activity for volunteers and is sympathetic to the environment. Mulch mats need to be heavy enough not to blow away and to press down on the vegetation beneath until it rots. Bark chips or grass cuttings may need to be topped up annually, while mulch mats and carpet should be checked regularly and put back in place.

11. Five years onwards

From year five onwards the trees will require little annual maintenance, but associated paths and open spaces or visitor features may require continued attention. A tree should survive and flourish without pruning and the Woodland Trust never prunes trees at this stage. However, formative pruning may improve the form of a tree and produce better timber in the long term if this is one of your objectives. If trees are snapped off, singling of leaders in any re-growth might be necessary.

Tree shelters, stakes and tree ties should be removed when they are no longer needed for support and protection. Over time blocks of trees will thin naturally or can be thinned manually to leave one or two specimens of each species in a block. At around 20-30 years, trees can be thinned to open up dense stands and let more light on to the woodland floor. Log piles can be created to encourage dead-wood insects and other wildlife, or some income can be generated by selling the wood for firewood or stakes.

12. Costs

The financial resources needed to carry out and look after tree planting and woodland creation projects can be considered under three headings: "acquisition"," creation" and "maintenance". But depending on who you are – perhaps a community group – you may have other costs too, including administration, accountancy fees and fundraising costs.

Creation costs: Obviously if you are buying land this is a major cost (along with legal and other fees) on top of which you may also have to pay for design work (if carried out for you), tool purchase, ground preparation, trees and tree protection, access infrastructure, contractors or machinery hire, plus signage, public liability insurance and public events including consultation, as appropriate.

Maintenance costs: This will include the maintenance of weed-free rings around the base of trees (chemical weeding or mulching), replacement of failed trees and shelters, fencing, maintenance of visitor and access features, litter clearance and public liability insurance..

We have prepared some "rough guide" typical costs below based on our own recent experience but please be warned that contractor prices vary enormously as do nursery, stock and sundries costs – and you will pay more per tree for smaller orders / sites:

Ground preparation:

- Ploughing - £100 per ha
- Ripping or mounding £100 per ha
- Establishment of low vigour grass sward £200 per ha
- Establishment of wildflower rich swards – from £500 per ha

Trees from tree nurseries:

- 1–2 year transplants £0.50–£1 per tree
- Root trained £0.50–£1 per tree
- 2–3m standards £5–£15 per tree

NB: By the 1,000 you may find prices much cheaper

Tree planting sundries:

- Tree shelters – 1.2m £1.00
- Tree shelter – 0.75 £0.70
- Spiral shelter £0.25
- Stakes from £0.35
- Bamboo canes £0.10

Fencing:

- Chestnut paling £5–£10 per m
- Post and rail £8–£15 per m
- Post and wire £4.00 - £6.00 per m
- Rabbit proof £4.50–£6.00 per m
- Deer proof £6–£10 per m

Paths:

- Grass path cutting £0.10 per m
- Hardcore path creation £10–£15 per m

Entrances:

- Management gate £250–£350 each
- Kissing gate £150–£300 each

Weeding:

- Chemical weed-free ring £0.08–£0.15 per tree/year
- Mulch mat £0.50–£1 per tree

Other matters:

- Litter collection up to £100 per day
- Consultancy fees (survey work, design drawings) £100 to £300 per day
- Event supervision £100–£300 per day

13. Tree planting organisations and publications

Useful contacts
The Woodland Trust

Visit www.yourwoods.org.uk - our website section dedicated to Community Woodland Groups and providing up to date and useful information or visit www.treeforall.org.uk for all the latest news and information about our campaign.

The Woodland Trust
Autumn Park,
Grantham,
Lincolnshire, NG31 6LL
Telephone: 01476 581111
Facsimile: 01476 594047
Email: enquiries@woodlandtrust.org.uk
Website: www.woodlandtrust.org.uk

The Woodland Trust may be able to help with supply of small packs of trees for schools and youth group partners.

For anyone planning to involve either a school or a community group in planting, the Woodland Trust offers a free event registration and promotion service to encourage people to attend planting events. This is part of our Tree For All project: for further details please visit the website www.treeforall.org.uk

The Forestry Commission (Forest Service in Northern Ireland) provides grants for the creation of new woodland. These schemes vary between countries, regions and over time. Contact your local Forestry Commission/Forest Service office for details of schemes that apply to your area. All these schemes require that the trees are established satisfactorily or the grant may be reclaimed.

Provide grants for woodland creation through the woodland grant scheme.

Forestry Commission England,
Great Eastern House,
Tenison Road,
Cambridge, CB1 2DU
Telephone: 01223 314546
Facisimile: 01223 460699
Email: fcengland@forestry.gsi.gov.uk

Forestry Commission Scotland
231 Corstorphine Road,
Edinburgh,
Scotland, EH12 7AT
Telephone: 0131 334 0303
Facsimile: 0131 314 6152
Email: fcscotland@forestry.gsi.gov.uk

Forestry Commission Wales
Victoria Terrace,
Aberystwyth,
Ceredigion, SY23 2DQ
Telephone: 01970 625866
Facsimile: 01970 625282
Email: fcwales@forestry.gsi.gov.uk

Forest Service of Northern Ireland
Dundonald House,
Upper Newtownards Road,
Belfast, BT4 3SB
Telephone: 02890 524480
Email: customer.forestservice@dardni.gov.uk
Website: www.forestserviceni.gov.uk

The British Trust for Conservation Volunteers (BTCV)
Conservation Centre,
163 Balby Road,
Doncaster,
South Yorkshire, DN4 0RH
Telephone: 01302 572 244
Facsimile: 01302 310 167
Email: information@btcv.org.uk
Website: www.btcv.org
Can provide help with woodland creation volunteer labour and books

The Tree Council
Offers general information on trees and woodland. Also holds a list of local tree wardens who can help with advice locally. Offer grants to schools for tree planting too and run a number of annual campaigns.
The Tree Council,
71 Newcomen Street,
London, SE1 1YT

Telephone: 020 7407 9992
Facsimile: 020 7407 9908
Email: info@treecouncil.org.uk
Website: www.treecouncil.org.uk

The Farming and Wildlife Advisory Group (FWAG)
Can give advice to farmers on woodland creation and have publications too.
English Head Office: FWAG,
National Agricultural Centre,
Stoneleigh,
Kenilworth,
Warwickshhire, CV8 2RX
Telephone: 02476 696 699
Facsimile: 02476 696 760
Email: info@fwag.org.uk
Website: www.fwag.org.uk

The Small Woods Association
Can give advice, has publications and organised events. Also a member's handbook if you join.
The Old Bakery,
Pontesbury,
Shropshire, SY5 0RR
Telephone: 01743 792644
Facsimile: 01743 792655
Email: enquiries@smallwoods.org.uk
Website: www.smallwoods.org.uk

The Wildlife Trusts
Another good source of information and advice. May be able to support your project through one of their local or regional groups.
The Kiln,
Waterside,
Mather Road,
Newark,
Nottinghamshire, NG24 1WT
Telephone: 0870 036 7711
Facsimile: 0870 036 0101
Email: info@wildlife-trusts.cix.co.uk
Website: www.wildlifetrusts.org

The Community Forests
A partnership of community forests around the country. If you are within one you may benefit from project support.
National Community,
Forest Partnership,
Ayton House,
Roberts End,
Hanley Swan,
Worcester,WR8 ODL
Telephone: 01684 311880

Facsimile: 01684 311370
Email: secretariat@communityforest.org.uk
Website: www.communityforest.org.uk

The National Urban Forestry Unit
Works to raise awareness of the positive contribution that trees make to the quality of life in towns. Produce case studies and other publications too.
National Urban Forestry Unit,
The Science Park,
Stafford Road,
Wolverhampton,WV10 9RT
Telephone: 01902 828600
Facsimile: 01902 828700
Email: info@nufu.org.uk
Website: www.nufo.org.uk

Natural England,
1 East Parade,
Sheffield, S1 2ET
Tel: 0114 241 8920
Fax: 0114 241 8921
Email: enquiries@naturalengland.org.uk
Website: http://www.naturalengland.org.uk/

English Nature
Northminister House,
Peterborough, PE1 1UA
Telephone :0173 455001
Facsimile: 01733 455103
Email: enquiries@english-nature.org.uk
Website: www.english-nature.org.uk

Other useful sources of information:

Flora Locale
Aims to promote good practice in the use and sourcing of native flora for all projects that have wildlife in mind. Have a data base that lists tree nurseries that can supply trees of local provenance.
National office: Flora Locale,
Denford Manor,
Hungerford,
Berkshire, RG7 0UN
Telephone: 01488 680 457
Facsimile: 01488 680 453
Email: info@floralocale.org
Website: www.floralocale.org

The Natural History Museum
Have a data base that allows you to enter you postcode and it gives you a list of all native flora including tree species for your area.

The Natural History Museum,
Cromwell Road,
London, SW7 5D
Telephone :0173 455000
Facsimile: 01733 568834
Website: www.nhm.ac.uk/science/projects/fff

The Groundwork Trust
85–87 Cornwall Street,
Birmingham, 3 3BY
Telephone: 0121 236 8565
Facsimile: 0121 237 3605
Website: www.groundwork.org.uk

Useful web addresses:

www.wildaboutwoods.org.uk
Information about the Woodland Trust's woods.

www.aie.org.uk
Arboriculture Information Exchange.

www.british-trees.com/guide/home
List our native tree species.

www.trees.org.uk
The Arboriculture Associations website.

www.rfs.org.uk
The Royal Forestry Society.

www.charteredforesters.org
The institute of Chartered Foresters.

www.isa-uki.org/pages/map
A list of wood turner/demonstrators.

www.offwell.free-online.co.uk/woodlands
Website of the Offwell Woodland and
Wildlife Trust.

www.naturenet.net
A good general information site including the following:
Protection of Trees and Hedgerows
Countryside Law
Rights of Way
Guided Walks
Biodiversity

www.r-a-p.co.uk

Aim is to provide adequate appropriate low-cost public liability, fire and window insurance covers for woodland owners.
www.thegreenwoodtrust.org.uk
The Trust's aim is to promote the traditional management of broadleaved woodland in the UK through teaching traditional craft and coppice management skills.

www.ecology.co.uk
Specialise in lending for the purchase of small woodlands.

www.fieldfare.org.uk
Fieldfare works with people with disabilities and countryside managers to improve access to the countryside for everyone

www.treetrader.co.uk – general information on woodland, trees and local suppliers.
Facsimile: 0870 4580536
Email: info@treetrader.co.uk

www.treefocus.co.uk – a list of UK tree nurseries.

Books:
Create a Farm Woodland. A tool kit to help you plan and plant, from experience in the National Forest ISBN 0 85538 464 6 Published 2003 visit www.nationalforest.org for more details.

Caring for Small Woods by Ken Broad, Earthscan publications 2003 ISBN 1 85383 454 8.
A practical manual for woodland managers and owners.

How to Make a Wildlife Garden by Chris Baines, Published by Francis Lincoln in 2000.A good introduction to wildlife gardening and has a section on woodland – though primarily aimed at gardens.

Plant a Natural Woodland - A handbook of Native Trees and Shrubs by Charlotte de la Bedoyere. The book discusses our native trees and shrubs and gives advice on planting large and small woods. Also a section on establishing wild plants on the forest floor. It is published by Search Press Ltd and costs £19.99 – www.searchpress.com or 01892 510850.

Our Native Trees: A Guide to Growing Northern Ireland's Native Trees from Seed.
Conservation Volunteers Northern Ireland.

'So, you own a woodland?' is available (ISBN 0 85538 463 8) from the Forestry Commission, Publications, PO Box 254,
Wetherby, Yorkshire LS23 7EW
Telephone: 0870 121 4180,
Facsimile: 0870 121 4181

Community Woodland Design Guidelines. 1991.

Davies, R.J. 1987.Trees and Weeds: weed control for successful tree establishment (Handbook 2).

Hibberd, B.G. 1989. Urban Forestry Practice (Handbook 5).

Hodge, S.J. 1995. Creating and managing woodlands around towns (Handbook 11).

Rodwell, R.S. 1994.Creating New Native Woodland (Bulletin 112).

APPENDIX 1: NATIVE TREES Characteristics.

Common name	Scientific name	Description	Habitat	Other
Alder	Alnus glutinosa	Fast growing tree that will reach 60m. Can be coppiced.	Grows on wet or flooded sites, often next to streams and ponds. Also on poor soils. Avoid acid soils, shady situations and very dry areas.	A versatile tree that can be used on reclamation sites or as a pioneer species.
Ash	Fraxinus excelsior	Large tree, up to 45m, that can live for some 200 years. Grey/green bark with distinctive black buds in spring.	Widespread, preferring limestone soils that are moist but well drained. Up to 450m altitude.	Grows well in mixed woodland if not too shaded. Comes into leaf late and often drops leaves earlier than other species.
Aspen	Populus tremula	Very hardy tree that can reach 20m. Matures in 50 years.	Suitable for a wide range of habitats from wet lowlands to mountain areas, but not too dry.	Common in the Scottish Highlands besides streams and rivers.
Bay Willow	Salix pentandra	Usually grows to 10m. Native to North Wales and northwards	Grows by rivers and other wet areas though not a common tree. Not shady sites	Has broad glossy leaves which are sticky and fragrant when young. Good for bees.
Beech	Fagus sylvatica	Can grow up to 40m. Large species which casts deep shade on the woodland floor.	Needs well-drained, sandy or chalky soils. Common in South East and Midlands Native only to southern England.	Popular as hedging species
Bird Cherry	Prunus padus	Grows to 15m. Native of the north Midlands northwards.	Common by streams in limestone areas such as north-west Yorkshire. Likes lime-rich soils.	Attractive in June when in flower and in autumn with its yellow and amber colours. Fruits edible for birds.
Black Poplar	Populus nigra	Grows to 20-35m. Now quite Scarce in the countryside.	Typically grows in damp soils, along stream and river sides.	Also known as the Manchester poplar. Very resilient to pollution and fast growing so was once commonly planted in cities Now rare and care should be taken to find stock of local provenance.
Box	Buxus sempervirens	Usually grows to 2-5m. A dense evergreen that	Typically grows on chalky soils such as the	The wood is the heaviest of the native

		is often no more than a shrub.	Chilterns, North Downs and the Cotswolds. Native to SE England	timbers and does not float!
Crab Apple	Malus sylvestris	Grows to 2-10m. Spiny with white flowers.	Found scattered in all areas including oak woodland, hedgerows and hilly chalky areas.	The wild crab is one of at least four species from which the domestic apple is derived.
Crack Willow	Salix fragilis	Tall tree that grows to 10-18m. Has glossy elongated slender leaves	Likes deep moist soils or riversides. Abundant in SE England and present throughout the UK.	If twisted, brittle twigs crack at the base. In water it produces fine red, coral-like roots.
Downy Birch	Betula pubescens	Similar to the silver birch, although even less demanding. Quick growing to 25m, but short lived showing signs of aging at 60 years.	Common on poorly drained soils and heaths, peat bogs and damper areas. Also by streams and pools.	It is a pioneer species – often the first to colonise areas of cleared woodland or wasteland.
English Elm	Ulmus procera	Once a common species in wet woodland, hedgerows and banks. Grows to 30m	Leaves dark green and rough above and pale beneath. Dark brown bark and cracked into rectangular plates	Tree numbers were devastated during the 1970's and 80's with outbreak of Dutch Elm Disease, thought to have killed over 80% of population. Root stock often remains and suckers from this but gets infected again between 5-10 years as bark matures.
Field Maple	Acer campestre	The only native maple to Britain growing to 20m. Often used in hedges as either a shrub or tree	Common on chalk or limestone soils in the south to the Midlands. Less common in northern England and Scotland	A medium sized tough robust tree with colourful leaves that turn deep yellow in autumn. Fruit tinged pink in early summer
Goat Willow	Salix caprea	More commonly a shrub but can grow to 10m. Found in many areas.	Hedgerows, woods and scrub, likes damp conditions.	Very distinctive in spring when branches are covered in green and yellow catkins Distinctive silvery male catkins- gives the name pussy willow before bright yellow stamens emerge.
Hornbeam	Carpinus betula	A graceful tree that grows to a height of 30m. It also keeps its lower leaves in winter like beech. Prefers sheltered positions.	Found in woods and hedges common in southern England. Grows well on heavy clay soils, as well as lighter soils but not acid sands.	One of the hardest and strongest of native timbers. Historically used for cartwheels, still used for piano hammers.
Large leaved Lime	Tilia platyphyllos	Large tree that grows to 40m. Native to the Wye Valley and South Yorkshire. Commonly planted.	Grows well in woods and often in limestone areas.	Often found in parks and avenues. First lime to flower – fragrant blooms hang in clusters in late June.
Osier	Salix viminalis	Between 3 to 6m	Commonly lining rivers and streams. Greyish – brown bark and fissured. Twigs are long	Plants can be cut annually to provide flexible shoots for basket weaving

			and straight. Catkins in late February, March and early April.	
Pendunculate Oak	Quercus robur	Usually grows to 20–35m known for its durability and longevity. Stalked fruit, the 'peduncle' gives it its name. Stalkless leaves	Best on damp heavy clays but will grow on sandy soils. Typically found in the eastern lowlands of Britain.	A robust tree that characterises the countryside. Supports a huge variety of insects throughout the year.
Purple Willow	Salix purpurea	Up to 5m	Damp places, frequently beside lakes and rivers. Leaves are narrow and long-oblong in opposite pairs on the twigs. Grey Bark, twigs yellow or grey sometimes tinged with red or purple.	Number of varieties grown for basket making across south of England
Rowan	Sorbus aucuparia	Small attractive tree that grows to 20m. Very hardy and occurs at a higher altitude than any other native tree – up to 1000m	Grows in many different soil conditions, though natural habitat is mountainous areas or lighter soils. Does well when planted in open woods.	White flowers in early summer developing into red berries in autumn. High in vitamin C, they are eaten by blackbirds, thrushes and starlings. Fruit can also be used to make a jelly.
Scots Pine	Pinus sylvestris	Has widest range of any pine growing in forests, woods and plantations. Up to 40m in height.	Hardy tree that grows throughout the UK. Good for growing on high ground, it also does well on heaths. Only native in Scottish Highlands.	Once the favoured tree for plantations but now replaced by quicker growing Sitka spruce. Provides good winter interest in mixed woodland.
Sessile Oak	Quercus petraea	Majestic tree that grows to 40m. Not planted as often as Quercus robur. Stalkless fruit, stalked leaves.	Grows well in woodland preferring high rainfall areas on lighter acid soils. Western and northern Britain	Open birch and oak woods (upland oak) are the favoured habitat
Silver Birch	Betula pendula	Graceful tree that stands out in winter with its white trunk and branches, grows quickly when young and can reach 30m. Fairly short-lived species at about 70–100 years.	Native throughout UK, preferring lighter soils and shallow peats. Common on dry heaths and open woodland.	Pioneer species often first to colonise recently cleared areas. This is helped by its light seeds that are widely distributed by the wind.
Small Leaved Lime	Tilia cordata	The other native lime with downward dropping branches and heart-shaped leaves. Grows to about 30m in height.	Found in mixed woodland on lime-rich soils. Fairly hardy tree in lowland areas. Often planted as a street tree or in avenues.	Once thought to be more common than oak, it coppices well and is long lived. It spreads by suckers with some trees more than 1,000 years old. Bees are attracted to the flowers in early summer.
Smooth Leaved Elm	Ulmus carpinifolia	Up to 30m	Native to Kent and East Anglia, rarer further north and west	Upright Branches and dome shaped crown
Whitebeam (Common)	Sorbus aria	Grows to about 15m. Planted all over the country and is common in streets and gardens.	Native to chalk and limestone hills of southern England. Also does well on adjacent	White flowers in early summer and red berries in autumn, which are taken by

		Striking silver-coloured leaves in early summer.	sandy soils.	birds.
White Willow	Salix alba	Native all over Britain except north-west Scotland. Grows to about 25m. Green/grey elongated leaves.	Common along lowland riversides and valleys, more frequent in southern areas. Likes damp or wet soils.	Suitable for pollarding. Helps to stabilise riverbanks, though not as common as crack willow.
Wild Cherry (Gean)	Prunus avium	Native in all parts, this attractive tree has white flowers before the leaves appear in April–May. Grows to 30m.	Found in woods and hedges. Prefers lime-rich and clay soils. Any position, but not deep shade.	Also common as park or street tree. Attractive to bees.
Wild Pear	Pyrus pyraster	Small Tree up to 15m	Rarer than the crab apple. Has quite spiny branches with particularly small and rounder fruits than other hybrids.	Distinctive grey or brown bark which breaks into small rectangular plates. White flowers in April. Fruits ripen in November.
Wild Service Tree	Sorbus torminalias	A relative of rowan and whitebeam, grows up to 25m. Maple-like leaves which turn deep red in autumn.	Grows on chalk, limestone and clay, traditionally from Kent up to Cumbria. More common in the west.	Edible red fruits are attractive to birds. Will only self-sow on land that has not been previously cultivated.
Wych Elm	Ulmus glabra	A dense canopied tree that can grow to 40m.	Often grows by water and likes damp and shady spots. Is also found on hillsides in Scotland.	Very hardy tree that copes well with polluted air, so is often used as a city park tree.
Yew	Taxus baccata	Very hardy evergreen tree that is commonly found in churchyards. Can grow up to 25m.	Tolerant of all conditions except very wet ground. Prefers chalk and limestone, but found in oak woods on other soils.	Our oldest living tree with some specimens more than 2,000 years old. Very strong, durable wood that was traditionally used to make longbows.
Hawthorn	Crataegus monogyna	Up to 12m	Often used as hedging species and excellent stock barrier. Provides a good habitat for birds and berries in the autumn.	

APPENDIX 2: NATIVE SHRUBS - characteristics

Common name	Scientific name	Height	Habitat
Alder buckthorn,	Frangula alnus	Up to 5m	Mainly on moist, acidic soils in lowland England and Wales, but also on lime-rich fenland peat. Cannot tolerate permanent waterlogging.
Blackthorn or sloe	Prunus spinosa	Up to 4m	Widespread and common except in northern Scotland on all except very acid or peaty soils. Intolerant of dense shade. Valued for its fruits (sloes). Its dense, spiny growth also makes it ideal for nesting birds.
Bramble	Rubus fruticosus	Up to 2m	Common in woodland, hedgerows and scrub throughout England and Wales. Thrives in well drained soils from acid to alkaline.
Buckthorn, purging	Rhamnus catharticus	Up to 6m rarely to 10m	Confined to lime-rich soils on limestone and in fens in England and Wales.
Creeping Willow	Salix repens	Low growing not much above ground level.	Locally dominant species in wet and dry sand dune stacks, acidic heathland and moorland.
Dog rose	Rosa canina	Up to 3m	Commonly found in hedgerows, scrub and woodland in a wide range of soils throughout England and Wales up to 550m
Dogwood	Cornus sanguinea	Up to 5m	Widespread in England and Wales, especially on lime-rich soils. Avoids dense woodland.
Elder	Sambucus nigra	Up to 10m	Widespread except in northern Scotland. Frequently found on lime-rich soils, on disturbed areas and on land rich in nitrogen.
Guelder Rose	Viburnum opulus	Up to 4m	Widespread, but rare in northern Scotland. Avoids very acid and very dry sites and dense woodland. Thrives on moist soils.
Hawthorn (Midland)	Crataegus laevigata	Up to 12m	Similar in size to hawthorn. Leaves are different from Crataegus Monogyna and has two stoned fruit rather than one in. This is an ancient woodland indicator in many areas Prefers shade in woods and heavy soils, typically in southern England Many hybrids between this and hawthorn.

Hazel	Corylus avellana	Up to 6m	Found in woodland, hedgerows and scrub. Common on chalk, limestone, neutral and mildly acid soils. A multi stemmed shrub, hazelnuts are good food source for squirrels and mice. Traditionally coppiced, often as understorey in oak woodland. Straight coppice stems are ideal for weaving into hurdles and other woodland products.
Holly	Ilex aquifolium	Can reach 20m height in some locations,	Grows on almost any soils and in damp areas. Also found as an understorey in oak and beech woodland. Can be used a hedgerow species. Female tree produces red berries in autumn – food for some birds. May be sterile if planted in deep shade. Provides winter interest in woodland.
Juniper	Juniperus communis	Rarely more than 5m.	Slow-growing evergreen shrub found in a wide range of habitats. Grows on chalk and limestone in open sunny places, but also in north on shallow wet acid peat and in shade of other conifers. Increasingly rare. Has the most extensive range worldwide of any tree. Spans the landmass of the northern hemisphere.
Privet	Ligustrum vulgare	Up to 5m	Widespread in England and Wales, especially in light woodland on thin, dry lime-rich soils. Cannot tolerate waterlogging.
Spindle	Euonymous europaeus	Up to 6m	In England, Wales and Southern Scotland. Common in woods and scrub on lime-rich soils.
Strawberry tree	Arbutus unedo	Rarely exceeding 10m	Evergreen tree or shrub. Only native in southwest Ireland. Slow growing and not long lived. Needs shelter to survive and is found mainly in Southern England and Ireland preferring drier situations.
Wayfaring Tree	Viburnum lantana	Up to 6m	Confined to southern England and Wales, nearly always on dry lime-rich soils. Cannot grow on waterlogged soils or in dense shade.
Willow, grey	Salix cinerea	Usually to 5m rarely to 10m	Very similar to Salix caprea, but classed as a shrub due to its size. Widespread. More tolerant of acid soils than S. caprea, but less tolerant of dry soils thriving in moist conditions.

APPENDIX 3: CHOOSING NATIVE TREES FOR DIFFERENT SOILS AND LOCATIONS

	Lowland non-calcareous (clay, sandstone etc)					*Lowland calcareous (chalk/limestone)*			*Uplands*		
Soil type	***Sands (podsols)***	***Iron pans***	***Brown earths***	***Soft mineral soils (acid clays)***	***Fen peats***	***Free-draining, shallow soils, less than 30 cm to rock***	***Heavy, well-drained alkaline clays and brown earths***	***Soft mineral soils, alkaline gleys and pelosols***	***Brown earths***	***Surface water, peaty gleys***	***Peats***
Occurrence	***Lowland heaths and Northern Britain***	***Mainly lowland heaths***	***Brown/red soil Mixed farming Areas***	***Mainly clay Vales***	***Low–lying fenland***	***Typical soils of many chalk and limestone areas such as the Cotswold***	***Chalk and limestone regions, foot of slopes and valley bottoms***	***Low-lying land, often adjoining rivers and streams. Some clay vales***	***Upland valleys***	***Upland plateaux especially northern England, southern Scotland and Northern. Ireland***	***Upland plateaux***
Major species	***Birch Scots Pine***	***Oak Beech Birch Alder Cherry Alder Willow Lime Hornbeam Scots Pine***	***Oak Ash Beech Alder Willow Hornbeam Scots Pine***	***Oak Beech Cherry***	***Cherry Alder Willow***	***Ash Beech Cherry***	***Oak Ash Beech Cherry Lime***	***Oak Ash Cherry Alder Willow Lime***	***Oak Ash Beech Cherry Alder Birch Scots Pine***	***Alder Willow Birch***	***Alder Birch Scots Pine***

NATIVE TREES FOR DIFFICULT CONDITIONS

Some sites may have special characteristics which will limit your choice of species.

Factor	***Wet***	*Dry*	*High altitude*	*Frost pockets*	*Exposure to wind*	*Near to the sea*	*Lime-rich (high pH)*	*Acid (low pH)*
	Waterlogging (permanent or temporary) prevents proper root functioning.	***Drought, lack of essential water (sites without extremes of pH)***	***Cold, shorter growing season, frost and snow damage, high winds often wet and acidic sites***	***Susceptibility to frost damage, especially to late spring frosts causing bud and leaf damage***	***Drought, dessication caused by rapid transpiration, physical damage, often cold***	***Salt in wind and spray affecting tree functioning, high winds***	***Rich in calcium (and less commonly other elements, usually on or near limestone or chalk, often dry).***	***Poor in essential nutrients commonly (a) wet, poorly drained moorland (b) very, dry, freely drained, sandy heathland***

Suitable species	***Permanently waterlogged:*** ***Alder*** *Other wet sites:* ***Ash*** ***Aspen*** ***Downy birch*** ***Bird cherry*** ***Sessile oak*** ***Black poplar*** ***Willows***	***Ash*** ***Beech*** ***Silver birch*** ***Crab apple*** ***Hawthorn*** ***Holly*** ***Juniper*** ***Sessile oak*** ***Scots pine*** ***Rowan*** ***Whitebeam*** ***Yew***	***Alder*** ***Ash*** ***Downy Birch*** ***Aspen*** ***Bird cherry (if sheltered)*** ***Holly*** ***Juniper*** ***Pedunculate oak*** ***Sessile oak*** ***Scots pine*** ***Rowan***	***Ash*** ***Downy birch*** ***Silver birch*** ***Bird cherry*** ***Hornbeam*** ***Juniper*** ***Scots pine*** ***Avoid:*** ***Beech***	***Ash*** ***Aspen*** ***Beech*** ***Downy birch*** ***Silver birch*** ***Hawthorn*** ***Juniper*** ***Small-leaved Lime*** ***Sessile oak*** ***Scots pine*** ***Rowan*** ***Whitebeam*** ***Willows*** ***Yew***	***Ash*** ***Aspen*** ***Hawthorn*** ***Holly*** ***Juniper*** ***Rowan*** ***Whilebeam*** ***Willows***	***Ash*** ***Beech*** ***Box*** ***Crab apple*** ***Wild cherry*** ***Hawthorn*** ***Holly*** ***Hornbeam*** ***Juniper*** ***Large-leaved lime*** ***Small-leaved lime*** ***Field maple*** ***Whitebeam*** ***Yew***	Wet: ***Alder*** ***Ash*** ***Aspen*** ***Downy birch*** ***Bird cherry*** ***Pedunculate oak*** ***Sessile oak*** ***Scots pine*** ***Rowan*** Dry: ***Ash*** ***Beech*** ***Silver birch*** ***Hawthorn*** ***Holly*** ***Juniper*** ***Sessile oak*** ***Scots pine*** ***Rowan*** ***Whitebeam*** ***Goat willow***