# Tree Planting Guide for Glastir Woodland Creation August 2015

**Contents**

[1.Introduction 2](#_Toc433617115)

[2. Glastir Woodland Creation grant scheme 3](#_Toc433617116)

[3. What is involved – overview 5](#_Toc433617117)

[4. Planning the work 6](#_Toc433617118)

[4.1 Working out your budget 6](#_Toc433617119)

[4.2 Timing of the work 6](#_Toc433617120)

[4.3 Getting your planting team together 7](#_Toc433617121)

[4.4 The planting season 8](#_Toc433617122)

[5 Ordering trees and materials .](#_Toc433617123)9

[5.1 Ordering trees 9](#_Toc433617124)

[5.2 Types of tree stock 10](#_Toc433617125)

[6 Tree protection 12](#_Toc433617126)

[7 Stock exclusion 13](#_Toc433617127)

[8. Ground preparation and weed control 14](#_Toc433617131)

[8.1 Is ground preparation needed? 15](#_Toc433617132)

[8.2 Dealing with weeds 18](#_Toc433617134)

[8.2.1 Chemical herbicides 19](#_Toc433617135)

[8.2.2 Mulches 20](#_Toc433617136)

[8.2.3 Physical control of weeds 20](#_Toc433617137)

[8.2.4 Other types of weeds 21](#_Toc433617138)

[9. Planting the trees 23](#_Toc433617139)

[9.1 Taking delivery of trees and storage 23](#_Toc433617140)

[9.2 Marking out the site 23](#_Toc433617141)

[9.3 Planting mixtures 24](#_Toc433617142)

[9.4 Equipment 25](#_Toc433617143)

[9.5 Planting technique 25](#_Toc433617144)

[9.6 Guards and tree shelters 27](#_Toc433617145)

10. Aftercare……………………………………………………………………………………….29

[10.1 Weeding 29](#_Toc433617147)

[10.2 Monitoring 29](#_Toc433617148)

[10.3 Beating-up 30](#_Toc433617149)

[10.4 Respacing 31](#_Toc433617150)

[10.5 Pruning…………………………………………………………………………………....32](#_Toc433617151)

[10.6 Thinning 32](#_Toc433617152)

[11 References 33](#_Toc433617153)

[12 Appendices 34](#_Toc433617154)

[12.1 Appendix 1: Checklist 34](#_Toc433617155)

[12.2 Appendix 2: Glastir Woodland Creation fencing specification 36](#_Toc433617203)

[12.3 Appendix 3: Guide for using New Planting site monitoring template 37](#_Toc433617204)

[12.4 Appendix 4: Guide for using New Planting site monitoring template 38](#_Toc433617205)

## Introduction

You may think tree planting is pretty straightforward – and, if you’re only planting a couple of trees, that’s true but planting hundreds or thousands of trees are a different matter.

This guidance is aimed at woodland creation schemes **of over a quarter of a hectare** – that’s 0.6 acres, and would typically mean planting at least 400 trees, although a lot of the details are applicable to smaller areas as well. It’s a general guide, and is based on the range of site types which occur in rural Wales.

The purpose of this guidance is to help you to get your planting scheme right first time. It explains what you need to do, and – crucially – when you need to do it. It gives advice on what makes a successful planting scheme and will show you how to avoid the common problems.

It does not go into the pros and cons of establishing a woodland or look in any detail at the subject of woodland design; instead, it assumes that you already know **what** you are going to establish, and deals with **how** you are doing to do it.

This document does not cover other tree planting situations such as gardens, hedges, orchards, street trees etc. Please be especially aware that tree planting in the vicinity of buildings and roads is a specialist topic, and is not covered here.

|  |  |
| --- | --- |
| **Managing your planting scheme…**  …how much of the work can you do yourself?  Throughout this guidance we’ll provide tables like this to help you decide. | |
| **Doing the work yourself** | **Using contractors** |
| Have a look through this guidance, and give some serious consideration to whether you want to ***plan and manage*** the planting scheme yourself.  There’s nothing stopping you from managing the scheme and organising all the work – but you will need to pick up some skills, and it will take time and effort.  You have the option of planning the work yourself, but calling in contractors to do specific jobs such as planting and herbicide spraying.  The larger the scheme, the more you might like to engage someone to organise the work for you. | You may choose to employ a forestry company or independent consultant to manage the planting on your behalf.  If you are in the Glastir Woodland Creation scheme, your woodland planner is a useful contact - they may be willing to take on the work or able to recommend a colleague in your area.  You will need to discuss with them the scope of their responsibilities and can agree from the outset whether they’re responsible for ordering the trees, organising contractors etc. and whether this includes follow-up treatment after planting (e.g. herbicide spraying in years 2 and 3).  It’s important to be clear and have an agreement in writing regarding the cost of their services, and when payment will be made. |

This guidance is designed for anyone planting a woodland but it will be of particular use to applicants to the Welsh Government’s Glastir Woodland Creation grant scheme - see the Glastir Woodland Creation page on the Welsh Government website.

In this scheme, a professional woodland planner designs the planting scheme and will provide maps and details of the required tree species composition. Tips which are of particular relevance to the Glastir Woodland Creation scheme are shown in **blue** outlined boxes in each section, like this one:

**Glastir Woodland Creation**

The Glastir application process involves checking for constraints on the site, including conservation features and archaeological significance. Woodland planners discuss these issues with applicants and ensure they are considered appropriately. This booklet doesnot describe these aspects of site planning.

Many excellent publications are available about woodland design and silviculture, some of which are available free online. We hope that many people will find the information useful – but please remember to seek professional forestry advice if necessary for your own situation.

## 2. Glastir Woodland Creation grant scheme

The first stage in the process of tree planting is to register as a customer with Rural Payments Wales at Welsh Government and receive a Customer Reference Number (CRN). You must also register your land with the Welsh Government Land Parcel Identification System (LPIS).

If you want to apply for a Glastir Woodland Creation grant, you need to put in an Expression of Interest (EoI) - the Welsh Government Glastir Woodlands website will inform you when an EoI window is open.

If you are acting as an agent in behalf of an applicant, you need to register as an Agent with the Rural Payments Agency Wales and you will receive an Agent Customer Reference Number RPW Online Activation Code.

For more information, see the Glastir Woodland Creation rules booklet - [**http://gov.wales/topics/environmentcountryside/farmingandcountryside/farming/schemes/glastir/glastir-woodland/glastirwoodlandcreation**](http://gov.wales/topics/environmentcountryside/farmingandcountryside/farming/schemes/glastir/glastir-woodland/glastirwoodlandcreation)

## 3. What is involved – overview



## 4. Planning the work

Before doing anything – or spending any money – it’s a good idea to sit down with a pen and paper, and make sure you’re clear about ***what*** needs to be done ***when*** and by ***whom.***

We’ve included a checklist in the Appendix which is designed to be used on your computer. It includes a column for ***“who”*** because we’ve found that one of the most common reasons for the failure of a planting scheme is misunderstanding about who is responsible for a particular job. The person in overall charge of the planting scheme should ensure that everybody involved in the work understands what they’re expected to do, well in advance, and that they’re able to do the work.

## 4.1 Working out your budget

The checklist will also help you to start planning the finances of the scheme, which can be critically important, especially if you are planting a large area. It’s not possible to know ***exactly*** what all the costs will be in advance but it ***is*** possible to get a pretty good idea. If you have reasonable estimates for each part of the job before you begin, you can take steps to save money in some areas if the overall bill looks like being too high. It’s also possible to monitor progress once the work has begun, and take action early if something looks like going over-budget.

When planning the budget, try to keep some funds back to deal with problems which may arise. For example, bad weather may increase the time needed for the planting operation, or you may have difficulties obtaining particular tree stock or equipment.

**Claiming your grant**

- You **do** need to ensure that the work has been done correctly in compliance with the Glastir Woodland Creation scheme rules.

- Glastir Woodland Creation grants can only be claimed **after** the work is completed.

- Fencing grants may be claimed as separate operations from the planting ie before the main planting grant but you must ensure the fences are in place before claiming that grant.

- You **do not** need to produce receipts or invoices when making your grant claim.

## 4.2 Timing of the work

Obviously you’ll need to know how long each piece of work is expected to take. This in turn will depend on the availability of labour, the type of site, the weather and so on.

Again your written plan will help you with supervising the work, and allow you to correct problems as soon as they occur.

**Grant claim deadline**

- New planting grants must be claimed by the date in your Glastir Woodland Creation contract.

**- New planting grants** are claimed on a Glastir Woodland Creation scheme capital works form which is found on RPW (Rural Payments Wales) online. Glastir Woodland Creation

- **Maintenance and Premium payments** are claimed on the Single Application Form (SAF).

- Remember to build extra time into your planting plan so that an unexpected problem doesn’t cause you to miss the claim deadline.

A good way to write the plan is to ***work backwards*** from a target finish date. You would ordinarily want to finish the work a few days ahead of that, to ensure the claim paperwork is completed and returned in time. Then it’s a good idea to build in a couple of extra weeks, to allow some breathing space if there are any delays arising from the weather or unforeseen problems. The amount of extra time that’s advisable will vary considerably. On small schemes it may only need to be a few days, but if you’re dealing with a large scheme and /or you’re inexperienced with tree planting, allow more time!

Remember to consider other factors which may influence the feasibility of getting the work done in time. If you’re a farmer using agricultural labourers to help with planting work, will they be available to work during the peak of the lambing season? Forestry planting contractors can be in high demand at this time of year so don’t rely on being able to find back-up at short notice. There are two logical approaches to this problem: start the work earlier, or arrange for additional help in advance.

## 4.3 Getting your planting team together

Early on in the planning phase, consider who will be involved. If you’re intending to do the planting work yourself, think about asking family, friends or neighbours to help. A planting scheme is sometimes daunting for one person and it can be helpful to have some company. But make sure they know what’s involved, and be sure of their commitment in advance.

If you’ll be using contractors, remember to book their services as early as possible, and ensure you have a contract signed or work order agreed in writing. This should specify the nature of the work involved, when it will be done, and a deadline for completion (which should be comfortably before your actual completion deadline). Remember to be clear on whether any ground preparation, installation of tree guards, or weed control responsibilities are included in the work, and whether VAT will be charged.

If you have friendly neighbours who are also working on a planting scheme perhaps you could share experience and resources - e.g. machinery for ground preparation, labour for planting, weed control - and you may get a better deal on the planting stock if you combine your orders.

## 4.4 The planting season

Trees are usually planted over the colder months of the year. For most of Wales, the planting season is considered to run from ***October to April*** (inclusive, if weather conditions permit) and this can extended in the upland areas where conditions are generally cooler. There are likely to be periods of prolonged cold weather which will interfere with planting work (most likely between December and March). ***You should not plant when the ground is frozen.*** It’s impossible to specify an “ideal” timing for new planting, because so much depends on the tree species and stock type, the weather and even the aspect and altitude of your site.

Any living tree – whether a seedling in a nursery or a huge veteran – survives by a process of growth, involving uptake of water and nutrients from the soil, the generation of energy in the leaves and movement through the tree of water, dissolved nutrients and sugars. These processes are all interconnected and are dependent on one another, which is why mature trees can be killed by heavy-handed or untimely pruning or damaging major roots. In temperate climates like Wales, trees have a period of dormancy over the winter. In deciduous trees, the soft leaves which would make the tree vulnerable to winter cold and winds are shed, and the tree’s growth is effectively “shut down” for the winter. The dormancy period is largely true of conifers too, although the needle-like leaves of most conifers are able to withstand the winter and are not shed in the same seasonal pattern.

Lifting a tree from the nursery and re-planting it on site creates a lot of stress for a young plant and, if this were done in summer when the tree is in full leaf, it would probably die. By moving and planting young trees while they are dormant, the risk of damage is minimised. Trees need to take up a lot of water in spring to allow bud-burst and early growth of foliage. Crucially, the roots start to grow, using stored energy, *before* leaves appear. These new roots are important for the health and establishment of the young tree. Planting trees in winter allows the tree time for some root growth prior to bud-burst, when there is the greatest water demand. Planting in autumn can be even better, as it allows two periods of relatively warm soil for root growth while there is low water demand from the leaves.

**Timing tree planting: DO’s and DON’Ts**

**DO*:***

***-*** Consider the ***type of stock*** you’re planting in view of its timing constraints **(Section 5.2)**

- Aim to ensure maximum time for root development before bud-burst

- Take advice on timing from a forestry professional or your tree nursery if you’re unsure

- Plan to do as much of the work as possible early in the season (between October and December) – this minimises the risk of disruption from the weather.

- Consider using cell- or container-grown plants if you need to extend the planting season (Section 5.2). Trees kept in cold storage (to preserve dormancy) can also be planted later.

**DON’T*:***

***-*** Plant into frozen ground.

- Plant during long periods of dry winter weather.

- Plant bare-rooted stock later than early May

-Rely on planting large areas late in the season

***-*** Forget the grant claim deadline

By now, you should be thinking in terms of a target “deadline” for completion of your own planting work. In order to complete the planning work, we’ll now describe the other things you’ll need to consider.

## 5 Ordering trees and materials

It’s sensible to order trees and other materials as early as you possibly can. That way you should avoid any shortages during the planting season, when demand is very high. You will need to specify to the nursery ***when*** you need the trees and other items, and ***where*** you would like them to be delivered.

## 5.1 Ordering trees

Planting stock can bought from commercial tree nurseries. Trees are sold in a range of sizes and types (see Section 5.2). There is a range of suppliers to choose from, ranging from large UK wide companies to small local businesses. It’s worth browsing websites and phoning a number of companies before placing your order.

Local companies may be able to give you helpful advice in relation to your site, and provide trees grown from locally-sourced seed. Nationwide companies may be cheaper (depending on the type of trees you buy) and may be more flexible with large orders at short notice. You’ll usually find that the price per tree goes down significantly on bigger orders. The price will also vary according to the type and size of stock you buy (see below for details). Nurseries will be able to arrange delivery for you.

Young trees are fragile and vulnerable to damage from rough handling between the nursery and their final planting site. It’s advisable to get the trees delivered to the site where they are to be used or as close to it as possible. This avoids time-consuming (and exhausting) double-handling of trees and greatly reduces the chance of damage.

**Smaller planting stock is best for woodland creation**

This is because it has a better “root-to-shoot” ratio, meaning that there will be a lot of roots and relatively few branches and leaves. Consequently, the trees are more likely to establish successfully, and once established they will bemore firmly-rooted, and grow faster, than trees which are planted out as larger stock.

The good news is that smaller trees are also cheaper to buy, easier and quicker to plant, and require less staking than larger plants. You should generally aim to buy forestry-sized planting stock, between 25 and 45cm, and avoid trees larger than 60cm.

You may wish to plant a few larger trees (e.g. feathered whips or half-standards) in a particular area, or on the edge of your scheme to provide some structural diversity and improve the landscape in the short-term. Don’t be surprised if the smaller trees have caught up within a few years.

## 5.2 Types of tree stock

Nursery catalogues and websites can be confusing at first; there are many types of trees available, and the variation in price is considerable. You should be able to make sense of the range with the help of our brief guide.

Woodland creation is mainly done with ***seedlings*** and ***transplants***. Nurseries conventionally use a size range (e.g. 40-60cm) to describe their types of stock, in combination with a code (e.g. “1U1”). A guide to these codes is given below.

**Guide to planting stock – Part 1**

Most trees are propagated in the nursery from a germinating seed or from cuttings taken from an existing plant.

***Seedlings*** are the smallest stock available and have been grown undisturbed since the seed was sown until lifting for sale. They vary in size according to age, species and how they were grown. Young plants grown from cuttings can be treated in a similar way.

***Undercut seedlings*** are seedlings which have remained in the seedbed for two years but had their roots cut after the first year. This is effectively a way of pruning the roots, and it leads to the development of a good fibrous root ball which favours the good establishment of the tree.

***Transplants*** are trees which have been ***lifted*** from the seedbed and then ***lined out***, i.e. planted out at a wider spacing to encourage their development. If they have been well looked after, transplants are usually better quality than seedlings, but they will be more expensive.

**Nursery codes**

Nursery catalogues give the size of the young tree (usually in centimetres) and a code. The first number refers to the number of years the plant spent in the seedbed after germination. The second number is the number of years the tree has been “lined out”. The letter “U” means the seedlings were undercut and grown on as described above. For example:

**1Yr** (or **1+0**) means a one-year-old seedling.

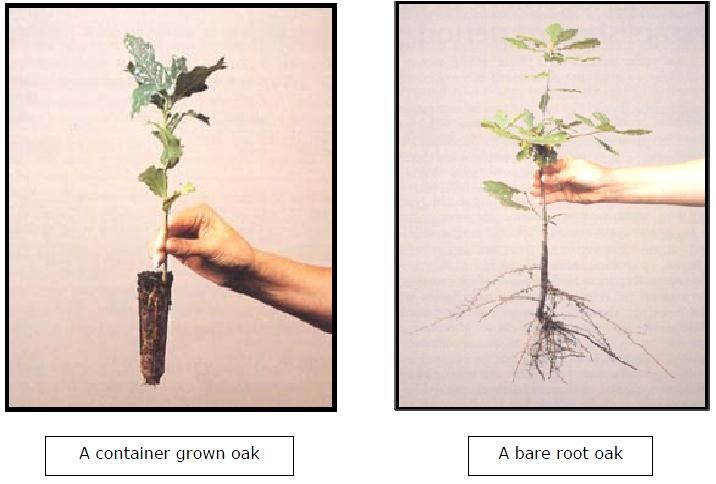
**1+1** means a two-year-old tree that spent one year in the seedbed and one year lined out.

**1+2** is a three-year-old tree that was lined out after one year.

**1U1** is a two-year-old tree, grown in its seedbed but undercut after the first year.

**20-40 (etc.)** is the size range of the stock, in this case between 20 and 40cm high.

**Guide to planting stock – Part 2**



**Container-grown or cell-grown** stock will arrive with the roots still protected by the container. The roots are kept moist by the rooting substrate, which is planted along with the tree (and sometimes known as **plug**). These trees can be stored prior to planting with reduced risk of losses, and have a longer planting season. It may be necessary to distinguish between contain-grown and **containerised** stock; the later generally means larger trees (see below) which have been open-grown, then transplanted into a tub for transport and sale.

**Bare-root stock** may come from seedlings or transplants, and is often sold in a range of sizes. This is the easiest stock to plant, and is generally cheapest. The trees are very fragile, and the roots are particularly susceptible to drying out. The planting season for these trees is shorter than container-grown trees.

**Whips** are a term meaning large planting stock (generally 1.0-1.5m height). This is too large for most woodland creation projects. **Feathered whips** are trees of the same size with well-developed lateral branches.

**Larger trees** are available and may be termed **Featured tree**, **Half-Standard** or **Standard**, or **Advanced Nursery Stock (ANS)**. These trees are too large to be suitable for woodland creation schemes, and are used in gardens, orchards and a range of landscaping purposes**.**

## 6 Tree protection

Many new planting schemes use some form of tree protection, which is installed at the time of planting. Examples are spiral guards and plastic treeshelters.

**When to use tree protection**

Tree guards and tubes can give valuable protection, and the money spent may save the greater cost of replacing dead trees later on. You should consider whether any of the following are likely to be a problem on your site:

***Rabbits*** can do a lot of damage to a planting site. Rabbit fencing is an option on larger sites but can be costly and difficult to install.

***Voles*** nibble the bark at the base of young trees, slowing growth and in some casesleading to the death of the tree. They tend to be a particular problem where grass is very long, allowing the animals to move around without predation, which means their population will increase Plastic guards can be effective, but must be properly installed – voles are sometimes found nesting in tree guards and under mulch mats. Good weed control around the trees and provision of raptor posts are recommended to reduce vole populations.

**Deer** are a serious problem on planting sites where they are present in large numbers; they also cause problems with natural regeneration in existing woodlands. Deer fencing is effective but costly; the favoured approach is for landowners to work together to manage deer populations. Some planting situations may require deer guards to be fitted to the trees; these tend to be large and relatively expensive and may stand out in the landscape.

The only sensible approach to ***livestock*** is to ensure that stockproof fences are maintained around the planting site. However in the event of the occasional sheep trespass, tree guards or tubes will certainly help to reduce the damage.

You should keep on top of weed control – but if the weeds get out of hand, tree guards or tubes can be invaluable in helping you to find the trees again. They will also give a degree of physical protection from ***mowing, strimming*** and ***herbicide spraying*** operations.

Some types of tubes and guards are designed to give trees a sheltered greenhouse like environment and thus promote growth. All guards – when properly secured with a stake or cane – give the young tree some shelter from strong winds and extreme winter conditions.

You need to be aware of the distinction between ***treeshelters*** – which are intended to improve the growth environment for trees – and ***tree guards***, which are intended mainly to protect the tree from physical damage.

You should always ensure that the size and type of guard you use is suitable for the planting stock you’ve chosen (if in doubt, ask the supplier). You’ll need to order canes or stakes to secure the guards in place, if these are not included with them.

Try talking to the nursery supplying your trees in the first instance; they can probably supply a range of guards and they’ll be delivering to you anyway. But don’t forget to compare prices with other suppliers who may be more competitive.

Some foresters advocate the use of some form of individual tree protection on all sites purely because they improve the “manageability” of the site by clearly marking the location of the trees. Others argue that – in areas where there is not a high risk of damage from pests – the expense can be foregone, on the condition that competing weeds are managed properly. They all agree that the risks to young trees should be considered on a site-by-site basis, and appropriate tree protection should be used where necessary.

## 7 Stock exclusion

Damage by livestock is one of the most common causes of mortality in young trees. ***Domestic animals including all horses, pigs, sheep, goats and cattle should be completely excluded*** from all woodland creation schemes. These animals can do a lot of expensive damage in a very short time.

**Why can’t the land be used for grazing?**

The animals will eat the young trees. Pigs will also take the trouble to uproot them, and any animals in high enough numbers will trample them. Most treeshelters and guards can be damaged by domestic livestock (if they don’t chew them, they’ll rub against them).

It is sometimes appropriate for **well-established** woodlands (over 20 years old) to be lightly grazed or used for stock shelter for short period of time. In some cases, light grazing – particularly by cattle – or scarification by pigs can be used to cultivate areas of soil and improve the conditions for natural regeneration.

**This is not the case with new planting schemes which need to be free of grazing and browsing pressure for the trees to establish properly.**

Fencing work should be carried out before tree planting. Consider planning the fencing **after** any ground preparation work has been undertaken otherwise the new fencing may create difficulties for machinery or be at risk of damage.

**Fencing and stock exclusion for Glastir Woodland Creation**

**All fencing for which Glastir Woodland Creation grant is being claimed needs to meet the Glastir fencing requirements (see Appendix 2).**

Glastir applicants must ensure that livestock are excluded for twelve years following the payment of the first instalment of grant.

|  |  |
| --- | --- |
| **Fencing** | |
| **Doing the work yourself** | **Using contractors** |
| Fencing is a skilled job and involves hard physical work. Efficient fencing often involves machinery such as tractor-mounted post knockers and post hole borers. The terrain can make it very difficult to get heavy materials to the right place.    If you’ve no experience with fencing, we recommend you use a competent contractor.    If you’re claiming grant for the fence, check the required specifications ***before*** ordering materials. | Make sure you clearly specify the type of materials and construction specifications and that these meet the Glastir scheme requirements if you’re claiming grant.  Don’t assume that contractors will be familiar with the specification – always do through the specification before they start work.    If the fenceline does not follow existing boundaries, it’s a good idea to mark out the route before contractors quote for the work. |

**Safety on Fencing**

Fencing may require machinery to be used and it usually involves lifting heavy, bulky materials over difficult terrain.All machinery and tools should be in good condition and operators must be suitably trained in their use.

See the **FISA guide no. 104 Fencing** for more information.

## 8. Ground preparation and weed control

The purpose of ground preparation is to ensure the site is in a suitable state for the establishment of young trees. So it makes sense that there’s no one-size-fits-all solution; what’s needed will depend on the condition of the site.

Ground preparation typically involves drainage work, ploughing and other cultivation methods. There are various methods for weed control including herbicide sprays, mulching and mechanical control.

## 8.1 Is ground preparation needed?

Sometimes it isn’t – and smaller planting schemes are more likely to try to manage without it.

If you can answer “yes” to ***all*** of the following questions for your entire site, you may not need ground preparation other than some weed control around the time of planting (see Section 8.2):

* Is the soil in good condition for the establishment of tree roots? (Check for “pans” – layers of compacted soil – which will inhibit root growth).
* Is the drainage situation appropriate for the trees you wish to establish?
* Is it straightforward to get a spade into the ground?
* Can the ground be screefed? (See box below)

Even if trees ***can*** be established without prior cultivation, it is still worth considering whether better tree growth could result from improvements to drainage. Your management objectives will come into play here: where timber production is a goal, drainage can be a good investment. It’s less important where the site is managed for wildlife.

From a practical point of view, you should consider whether your establishment costs could be reduced by planting onto a scarified or ploughed site or one which has received herbicide spot spraying.

When correctly planned ground preparation, this will reduce the initial weed problem and speed up the planting operation by providing an easily-worked site. Obviously the cost of ploughing, scarifying or spraying could outweigh the benefits, depending on the size of the site and the type of land. Access to machinery and operators is clearly a factor; farmers with their own machinery may be more inclined towards ground preparation than other landowners. The final decision should be based on the condition of the site.

Steep slopes can prevent machine access, and restrict the options for cultivation. You should be aware of the environmental sensitivities regarding cultivating the soil and modifying drainage, and take care to avoid causing soil erosion or damaging any watercourses. For further information see References (Section 11).

**Types of ground preparation**

**Drainage** can be improved prior to tree planting, using a range of techniques which are familiar to farmers and foresters. It is a good idea to plan the layout of permanent drains (main drains and sub-drains) before the other work is carried out. Most drainage channels are prepared using a tracked excavator; in some soil types mole drains may be considered which can be created with agricultural equipment.

**Scarification** is the shallow cultivation of topsoil, including moving away any debris and vegetation, prior to planting. When mechanised, this is done in rows with spacing corresponding to the required tree stocking density. A manual alternative is **screefing** which involves moving the top soil with (depending on the difficulty of the site) the planting spade, the heel of a boot, a mattock or a grub hoe.

**Ploughing** is a common treatment on flat or moderately sloping sites. It can help to improve drainage and turns the soil to bury the existing grass. On pasture with vigorous grass growth, there is the option of re-seeding the ploughed field with a low vigour grass mix, to reduce competition to the trees and make subsequent weeding easier. Ideally ploughed sites should be left to settle for a couple of months, but trees should be planted before competing vegetation becomes a problem. This means ideally ploughing in late summer / early autumn. Plough furrows may be considered advantageous as they provide lines to simplify the planting operation, and trees may be planted on top of the ridge on wet sites and in the shelter of the furrows on exposed sites. However some people contend that the ridged soil form interferes with strong root growth and that waterlogging problems are better dealt with by ripping or sub-soiling (see below).

**Ripping** or **Sub-soiling.** This may be appropriate if the site has been regularly ploughed (or otherwise compacted) in the past, creating a “pan” which would inhibit root growth. The procedure involves dragging deep metal blades behind a heavy-duty tractor, to break up pans beneath ploughing level, allowing the movement of water (and tree roots) between the soil horizons. Again, the land should be allowed to “rest” for a couple of months before planting.

|  |  |
| --- | --- |
| **Ground preparation / cultivation** | |
| **Doing the work yourself** | **Using contractors** |
| First have a good look at the site and dig some pits to examine the soil. ***Is ground preparation necessary?*** If you’re not completely sure, you should take advice before you take any action.    If you are a farmer with access to tractors, excavators and ploughing equipment, that’s obviously an advantage – but don’t let the availability of equipment dictate what you do. Consider what’s best for the site first and ***avoid unnecessary soil disturbance***.    Before starting any form of cultivation, think carefully about (a) long term access to the site (b) the layout of drains and ditches (c) the planting plan and tree rows.    If you have no experience of mechanised cultivation, we suggest you take expert advice before undertaking any major drainage work or ground preparation.    Hired self-drive machines (such as mini-diggers) can be useful for odd jobs such as drain clearance and scarification on smaller planting sites; however they are much less efficient than full-size machines and their use on larger jobs should be avoided. | Glastir Woodland Creation planners can advise you on whether ground preparation is necessary on your site and which method is appropriate.    Forestry companies and independent consultants will be able to help you specify appropriate ground preparation and drainage and engage contractors with machinery on your behalf.    Alternatively, you may find local farmers or agricultural contractors who are able to help. You should ensure they understand what’s required for tree planting (eg type and depth of ploughing, furrow spacing appropriate for the stocking density etc.). Remember to check their availability in advance and leave time for cultivated land to “settle” before planting. |

## Safety on ground preparation

Ground preparation using machinery should only be carried out by fully-trainedoperators using equipment which is in good condition and appropriate for the work. Operators should be warned about any hazards on the site (e.g. power lines, buried pipes, gullies or mine workings) and they ***must be clearly marked out on the ground.*** It may be necessary to take steps to ensure public safety during the work, if there is public access to the site.

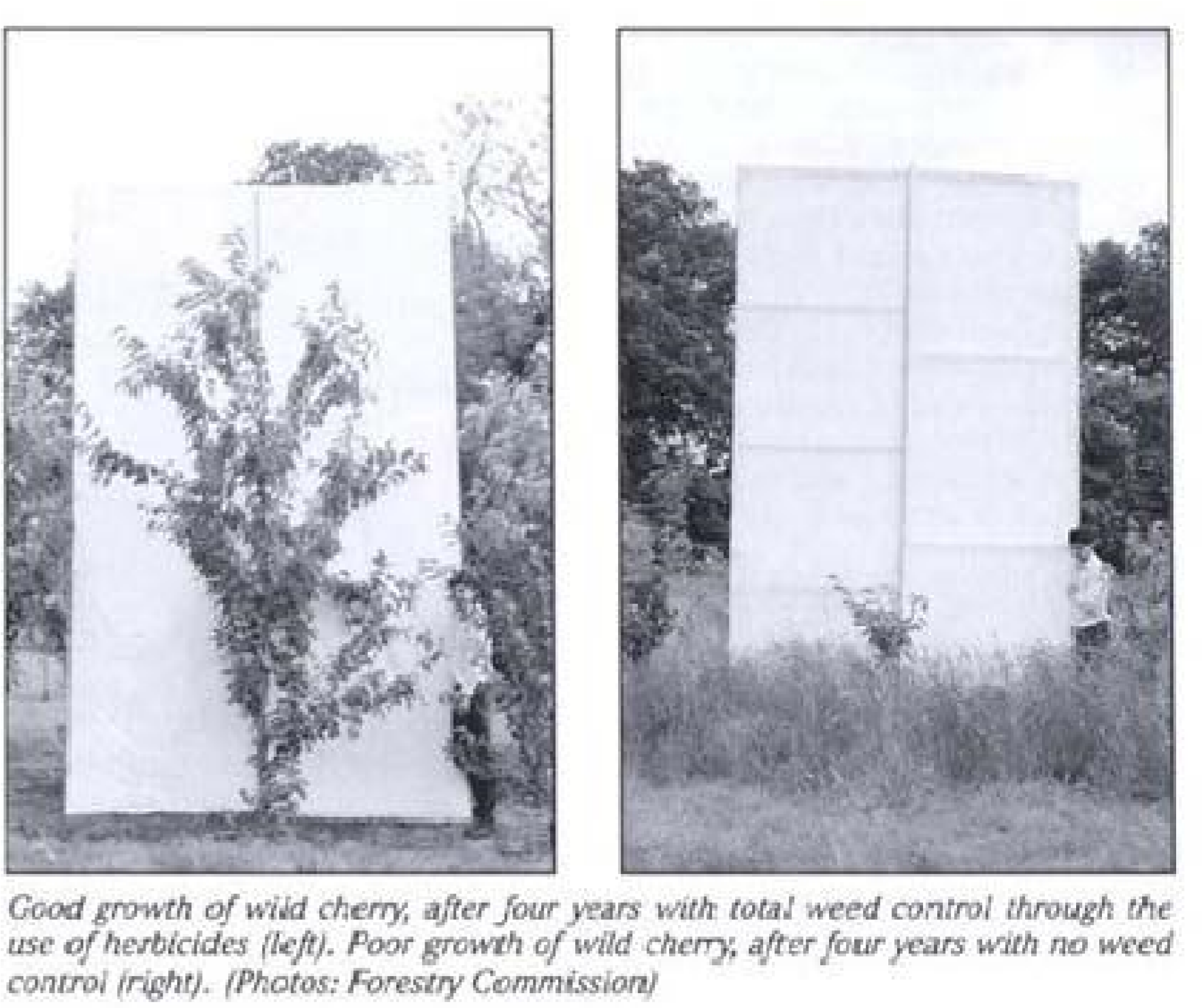
See the HSE / AFAG guide 704 Excavators in Tree Work <http://www.hse.gov.uk/treework/safety-topics/excavators.htm>, 705 Steep Slope Working in Forestry <http://www.hse.gov.uk/treework/safety-topics/steep-ground.htm> and the HSE publication Managing Health and Safety in Forestry <http://www.ukfisa.com/assets/files/safetyLibrary/MHSF-2014.pdf> for more information.

## 8.2 Dealing with weeds

You ***will*** need to take action to deal with weeds. One of the most common reasons for failed planting schemes is inadequate weed control. This can often be attributed to site owners not being aware of the need for repeated weed control, or misunderstandings with contractors about whose responsibility it is.

For woodland creation, a weed is any plant which is competing with a planted tree for water, nutrients or light. This competition will slow the tree’s growth, meaning that the tree will take longer to grow to the stage when it can out-compete the surrounding vegetation. That’s why effective weed control in the first three years is time and money well-spent. A well-weeded tree will quickly grow to the stage when no further weeding is necessary.

The need for weed control is made obvious by these two photographs:



**Good growth of wild cherry after four years with total weed control through the use of herbicides (left). Poor growth of wild cherry after four years with no weed control (right) (Photos: Forestry Commission)**

**You should aim to maintain a weed-free zone of 1m diameter around trees for their first three years of life.** On more fertile sites it may be necessary to control weeds for longer.

You will need to decide on an appropriate method of weed control for your site. Remember that most of these methods will need repeated treatments each year; you should select a method (or combination of methods) that is feasible for your budget, and the time, skills, labour and equipment which is available to you.

## 8.2.1 Chemical herbicides

Chemical treatment is the most commonly used form of weeding in woodland establishment. It is regarded by many forestry practitioners as being much cheaper and more practical to implement than the alternatives. Herbicides can be extremely effective and have limited negative effects, when properly applied on an appropriate site.

**Types of herbicide**

***Foliar acting*** or ***emergent*** chemicals are absorbed by the leaves of the target plant and are usually applied as a spray (sometimes with an atomiser or wipe). Some types have a low toxicity and are neutralised on contact with soil which reduces their environmental impact. They are not effective until the weeds are established and able to absorb chemicals via their leaves. It is important to avoid spray drift or else non-target plants could be killed (including young trees). Avoid spraying when trees are in leaf. Note that the use of treeshelters can reduce the risk to trees.

***Residual, pre-emergent*** or ***soil-acting*** herbicides act via the roots and are normally applied before planting or immediately afterwards. As the name suggests, these chemicals can have a longer-term effect on weeds around a tree.

A combination of types may be most appropriate, e.g. a residual herbicide applied at the time of planting, with subsequent treatments twice a year with foliar herbicide. It is very important that chemicals are only applied by qualified operators, who can ensure the correct mix and application rate is applied. Full records of chemicals applied to the land should be maintained by operators and the landowner.

Herbicides can have serious environmental consequences if used incorrectly and are unsuited to some sites with high environmental sensitivity and land which is being managed organically. Their use in the vicinity of watercourses is restricted and they should not be applied close to springs etc. where water will be abstracted for use.

The Forestry Commission has published the booklet *Reducing pesticide use in forestry* (**see Section 11 References**), which suggests that the feasibility of non-chemical control methods should be adequately explored before the decision to use chemicals is made. Chemicals should only be applied by skilled and certified operators, after a suitable assessment of the site.

## 8.2.2 Mulches

Mulching is a method of preventing weed competition by laying down material which smothers the weeds while allowing the tree roots to grow without disturbance. Mulches may also help trees by retaining moisture in the soil in summer conditions, enabling the tree to absorb it.

**Mulching**

***Inorganic mulches*** include purpose-made polythene mats and sheets of thick plastic laid out around the tree. These will not need to be replaced during tree establishment and may remove the need for chemical treatment; however inorganic materials should be collected up when the trees are established.

***Organic mulches*** are those which will rot down naturally into the soil. Sometimes composted material is used as mulch. Wood or bark chippings are often used as mulch in small planting schemes and gardens. Mulch mats made from biodegradable plastics are now more widely available. Like inorganic mulches, the approach can remove the need to use chemicals but organic mulches may need replacing or topping up from time to time. The various types of mulches offer an environmentally sensitive way of establishing trees; however you shouldn’t underestimate the additional cost of materials and time that will be needed to install them properly.

Mulch sheets and mats will need to be secured to the ground (usually with pegs). Chippings and other loose materials can be very difficult to carry on large and difficult sites (you will need a large volume for this to be effective). On the other hand, installing mulches can be ideal work for willing volunteers.

## 8.2.3 Physical control of weeds

This may include hoeing, scything, strimming or mowing – and sadly, it’s not usually effective for grasses and other herbaceous weeds.

The problems are that:

* Cutting grasses only reduces their uptake of water for a short time; in fact, they tend to respond by growing back more vigorously – so cutting can actually work against you.
* It’s very difficult to get close enough to the tree with mechanical tools to control the competing plants. It’s ***essential*** to use tree guards when strimming – otherwise you’ll either miss the weeds or damage the tree.
* Grass cutting is time-consuming, must be carried out repeatedly through spring and summer and is easily disrupted by periods of bad weather and other eventualities. Even with a ride-on mower or tractor, it’s a fiddly business mowing between trees. There are very few situations where landowners are actually able to reliably keep the grass under control using these methods.
* Even if the grass is kept low, it’s still there - albeit smaller - and competing with the trees for water and nutrients. This is why mechanised weeding is much less effective than chemical control or mulching.

It’s quite acceptable to mow or strim between the trees if you wish. Some people do this for aesthetic reasons; it’s actually a good idea to prevent the grass getting too long between tree rows, to prevent the build-up of vole populations which damage trees. But do bear in mind that an additional form of weed control – mulching or herbicide – will be advisable in the 1m diameter around each tree.

**A word about false economies**

The Glastir Woodland Creation scheme gives you a lot of flexibility, and in some cases this may enable you to save some money.

The scheme rules ***do not specify*** that a particular type of ground preparation or weed control should take place, or that treeshelters or guards must be used.

However the rules ***do specify*** that the applicant is responsible for ensuring that the site is fully stocked with trees for twelve years.

To give an extreme example: an applicant may decide to plant the cheapest available trees using unskilled labour without any ground preparation or weed control and without using treeshelters.

This would undoubtedly be a cheap operation – and if the trees established successfully, the applicant would probably come out of the grant scheme at a profit.

However this approach is likely to result in a high failure rate. The applicant then faces either a grant reclaim, or the expensive business of dealing with weeds and pests, andplanting new trees. Their other grant claims – including Single Payment - may be held up while the new planting site is put right.

You don’t need to go to the other extreme and make the job too expensive; just consider the site carefully and make a balanced decision about what’s necessary. You can then monitor the tree establishment and take action to correct any problems.

## 8.2.4 Other types of weeds

So far we’ve mainly considered the treatment of grasses and herbaceous weeds, which are the most common problem on woodland creation sites in Wales.

***Bracken*** should be cleared before planting and is likely to need repeated treatment for satisfactory removal. Pre-planting clearance of bracken by pigs is reportedly effective, but may be difficult to arrange. Chemical treatment methods are available (although becoming increasingly restricted owing to changes in regulations). The plant can also be controlled by cutting, pulling and stem bruising methods. Mulching will not be effective as bracken rhizomes can spread beneath them.

***Bramble*** should be cleared before planting, including from adjacent areas if possible. Mulches are ineffective as the bramble plants grow over the top. Cutting (e.g. with strimmer or brushcutter) works temporarily. Pulling should only be done with great care after tree planting to avoid damaging trees. Foliar-acting herbicides can be used successfully on bramble but note that operators will need to target the bulk of the plant not just the creepers within 1m of each tree.

***Woody weeds*** (e.g. gorse and broom) can be cleared prior to planting with a chainsaw or brushcutter (depending on size). Root removal, repeated cutting or herbicide application may be used to prevent re-growth.

***Invasive species*** which sometimes crop up in planting areas include ***Japanese knotweed, Himalayan balsam, Rhododendron, giant hogweed*** and ***ragwort.*** These species are major pests and if you have them on your land you should seek professional advice about their control. They will not necessarily prevent tree establishment but can be particularly persistent and there could be a danger of them spreading to other land. Some species are classed as Hazardous Waste and you should observe the relevant regulations when dealing with and disposing of them.

|  |  |
| --- | --- |
| **Weed control** | |
| **Doing the work yourself** | **Using contractors** |
| If you intend to control weeds by mulching, there’s no reason not to do the work yourself if you’re physically fit and have enough spare time. You may even be able to persuade other people to help. Be realistic about the cost of materials and the time and effort involved.    If you’re considering weed control by physical methods (strimming, mowing etc.) please consider the comments above on its effectiveness. If it’s the only weeding you have in mind, you may come to regret it.    You should not use machinery (particularly chainsaws) unless you are suitably trained and have the right protective equipment.    Chemical weed control should be carried out by qualified and certified professionals. You should consider non-chemical methods of weed control first. If you have appropriate training and equipment (this applies to many farmers) you may decide to undertake the work yourself. Always carry out a risk assessment as required under COSHH regulations and site based environmental assessment. Observe the directions on the product label regarding application rates, safe usage and protective equipment. | You should always clearly specify the weeding control (area to be weeded, method, time scales) in writing when engaging a contractor. You may wish to establish a long term contract to include top-up spraying or retreatment as necessary; make sure the contractor’s responsibilities are clearly defined and understood. If follow-up treatments are included be clear about who will assess the site and decide when treatment is necessary.    Operators who will be applying chemicals should have a certificate of competence in the safe use of pesticides and should carry appropriate insurance. You may ask to see a contractor’s certificates but it’s a good idea to give them some warning of this as they may not keep copies to hand at all times. Qualified operators will be happy to send you copies of the relevant certificates before starting work.    Operators should keep full records of the type and amount of chemicals applied. Remember to ask for a copy of this information for your records. |

**Safety on Pesticides**

Chemical pesticides should ***only*** be applied by fully-trained and certified operators, using appropriate tools and protective equipment, and having carried out the risk assessment required under the Control of Substances Hazardous to Health (COSHH) regulations.

Check [www.pesticides.gov.uk](http://www.pesticides.gov.uk/) for up-to-date information about regulations, product approval and off-label use of pesticides. The Forestry Commission’s *Reducing Pesticide Use in Forestry* (free online, see References) includes guidance on avoiding impacts to neighbours and the general public.

## 9. Planting the trees

## 9.1 Taking delivery of trees and storage

You should arrange for the trees to be delivered as close to the start of planting as you can, and if possible get the trees dropped off close to the planting site. You should ensure that there is a secure, sheltered place to store the trees before they are planted. Always check the documentation to ensure you received what you ordered and contact the supplier immediately if you think there is a problem.

Young trees are very fragile and must be handled with great care. Bare-rooted trees are normally supplied in bundles, contained in protective plastic bags. They should be kept in these bags for as long as possible; ***don’t leave the bags open or the roots will dry out***, which can kill the trees. Tree roots should not be exposed to the wind or draughts for longer than a few moments. Bags should not be heaped on top of one another, should not be thrown or dropped, should be kept out of direct sunlight and should be protected from frost. If it’s necessary to store bare-rooted stock for an extended period, the trees can be “heeled-in” to soil to prevent the roots drying.

You can check the trees by opening some bags at random and examining them. Look for size of tree, quantity in the bags and the quality of the stock. You can check whether a tree is alive by scraping a small piece of bark off the main stem: if the tree is alive it should be green or white below the bark; brown or yellow may mean the tree is dead or dying. Container-grown stock will be supplied in its containers or “cells”, and the trees should be left in these until the time of planting. If there is a serious delay, you can moisten the roots of containerised stock to keep the trees healthy.

**Safety on tree planting**

Don’t underestimate the physical nature of large-scale tree planting. It’s challenging work, especially on steep and difficult sites in bad weather. You should be familiar with <http://www.hse.gov.uk/treework/safety-topics/planting.htm> . If your stock has been treated with chemicals, you should wear appropriate safety equipment when handling and planting the trees. Boots with steel toe caps are a good idea for planting work, as you may use the blade of the spade to lever against the boot, in order to lift the soil.

## 9.2 Marking out the site

You will find it helpful to mark out different parts of the site with canes before planting to ensure the right species are planted in the right place. (A piece of high-visibility tape tied to the top of each cane will make them much easier to see.)

**Planting in the Glastir scheme**

Your Glastir Woodland Creation contract will include a map showing the required planting layout and details of the required species and stocking density for each area.

You should keep in mind the required stocking density and understand what this means for spacing the trees. Make sure you are clear on this ***before*** starting work. It’s much easier to get the spacing right if you plant in regular rows. (This will also make it easier to find the trees when weeding later on). If you’ve carried out ground preparation and/or weeding, the row spacing may be fairly clear on the ground already and you’ll just need to concentrate on the distance between trees along the weeded or cultivated rows. A measured cane or length of wood is helpful for this, although you may find you can do without it after a while. Check your work from time to time to make sure you’re getting the spacing right.

**Stocking densities**

Different stocking densities are used to establish woodlands depending on the management objectives, the type of site and the species of tree. A higher stocking density (more trees to the hectare) means the trees are more closely spaced. If the trees are being grown mainly for timber production they should usually be established at a stocking density of at least 2,500 trees/ha or more (2m spacing or closer) although there are a few exceptions. Close spacing leads to competition among the trees for light and results in rapid vertical growth. Most of the branch development will be in the crown of the tree which means fewer (and smaller) knots in the timber. Close spacing is also used where carbon sequestration is an objective as more carbon can be stored for a given area of woodland and there is a greater likelihood of the carbon continuing to be stored (i.e. used in timber products) rather than being released into the atmosphere when the trees are mature.

Trees grown for timber will require further management work, most notably thinning and pruning to ensure good timber quality.

Woodlands established mainly for biodiversity or landscape amenity tend to be planted at lower stocking densities - 1,600 trees per ha (2.5m spacing) is common in Wales. The wider spacing allows bushier growth in the young trees, and the wider spacing will reduce the need for early thinning work once the trees are established.

## 9.3 Planting mixtures

Many planting schemes involve some sort of species mixture ***within*** a mapped area. In some cases it may be appropriate to plan “intimate mixtures” – i.e. all the tree species are mixed up randomly. This is more likely to be the case where there are a small number of species which can have similar requirements for growing conditions and are expected to grow at roughly the same rate.

More frequently – particularly with broadleaf planting – it is appropriate to plant trees in clumps, or groups, of one or more species. This way you can tailor the planting to the exact site conditions, and ensure that faster-growing trees will not shade-out the slower, light-demanding species. For example, oak and hazel may be planted on drier ground and alder and willow on wetter parts of the site. It’s not usually necessary to mark out the site precisely to plant in this way but you should think about your strategy before you begin and estimate the number of trees of each species you’ll need in the main parts of the site before you start opening bags of trees.

**Species mixtures in the Glastir scheme**

Your contract will specify the main species to be used. If there are particular site constraints with regard to mixtures your Glastir Woodland Creation planner will make these clear.

## 9.4 Equipment

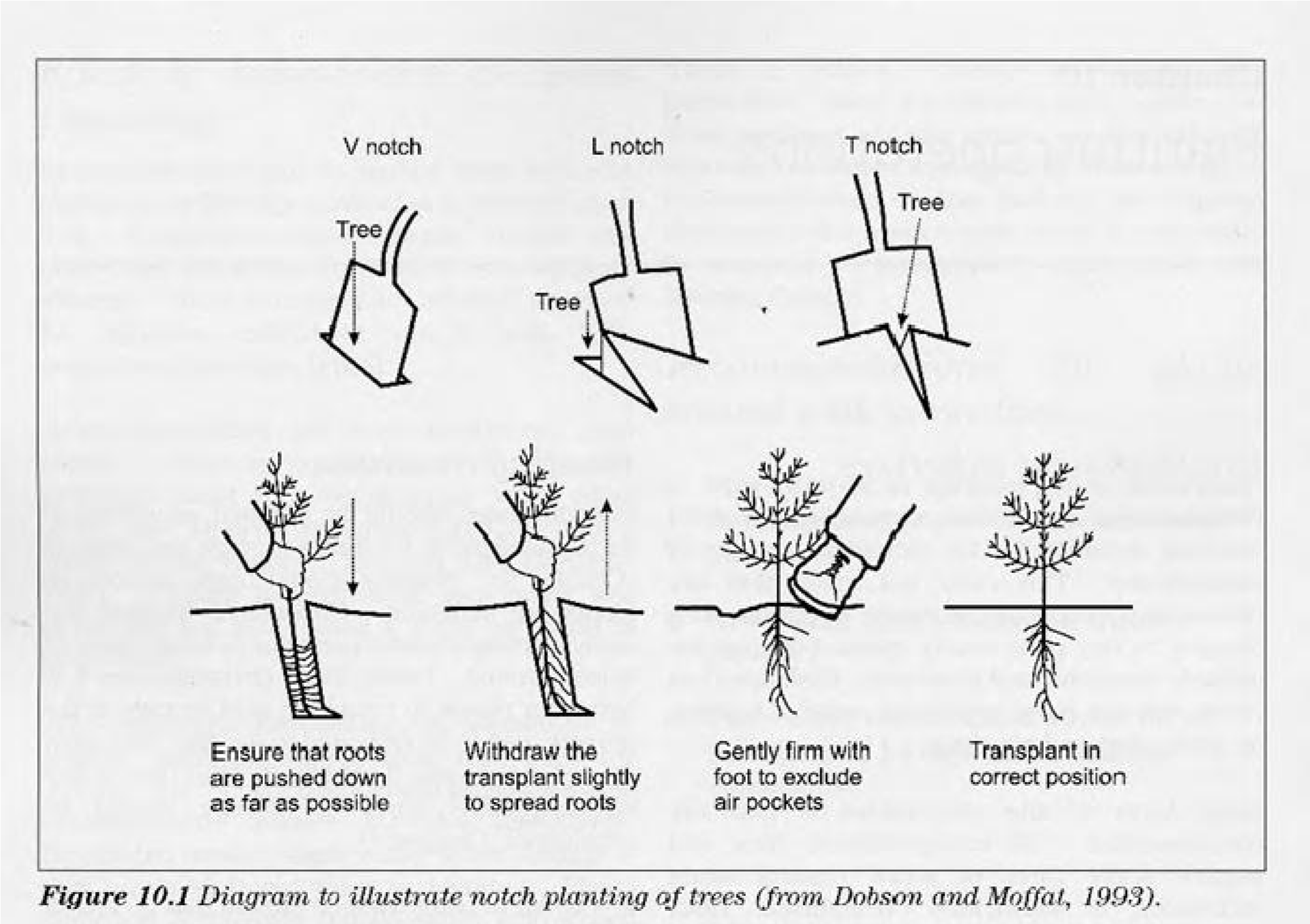
Trees can be planted perfectly well using a normal garden spade, the longer its blade the better. Planting contractors often use a specialist planting spade which has a longer, narrow blade designed for notch planting. On steep ground many planters prefer to use a mattock, which can be easier to use on the slope. On rocky ground, a spade with a curved lower edge (rather than square) is a great advantage.

Trees should be moved around the site in a planting bag (normally a tough, plasticised shoulder bag) which is available from tree nurseries and forestry suppliers. The bag will help prevent roots drying out during the planting operation. Trees can be transferred from their containers or delivery bags straight into the planting bag and lifted out one-by-one for planting.

## 9.5 Planting technique

Please note that the following advice applies to “forestry-size” trees which are generally less than 60cm high. Larger trees will require different techniques for planting and often require staking. The “notch” planting techniques, as shown in the following diagram, are usually best for ensuring good root protection as well as efficiency during planting. The type of notch will depend on the soil conditions and the size of tree. The simple “V” notch is often suitable for smaller bare-root stock; “L” and “T” notches may work better with container grown stock (which has larger roots) and bigger bare root stock.

Do not prune or damage the roots during planting and don’t use the spade to push the roots into the notch. If you’re struggling to fit the tree into the notch, try a different type of notch and a deeper cut. Be careful not to plant trees too shallow or too deep. The final position of the tree should result in the root collar being level with the soil. The root collar can usually be identified on young trees by lightly rubbing the stem near the root and looking for the point where there is a change of colour.



**Diagram to illustrate notch planting of trees (from Dobson and Moffat, 1993)**

If you’re planting a large number of trees, the various actions involved in planting will quickly settle into a routine. You should plant the first few dozen trees slowly and methodically and take care to observe the following steps with each tree:

* Check the spacing (along and across rows) – are you in the right place?
* Make a notch of appropriate size and shape (you’ll get the hang of this quite quickly)
* Gently insert the tree – slightly deeper than it needs to go – and ensure the roots are comfortably in place, without forcing them with the spade
* Slightly withdraw the tree as you begin to firm in the top of the notch with your boot. The tree should now be vertical with its root collar in the correct position at the soil surface.
* Continue to gently firm the soil around the tree with your boot, taking care not to scrape the stem.

**Don’t rush. The trees are fragile and this is their most vulnerable moment. If you’re in any doubt about what you’re doing, slow down and think it through. When you’re comfortable with the routine of gently and carefully planting a tree, you can start to increase your planting speed.**

## 9.6 Guards and tree shelters

These are normally fitted immediately after planting. You may wish to fit the guard at once or plant a row of trees and then go back and fit the guards. If you are working with someone else, it may be more efficient to have them follow on behind you fitting the guards. Guards and shelters vary in their construction and their need for canes or stakes. You should follow the manufacturer’s instructions when installing them. Take care to do it properly, or you’ll be wasting your time: for example, vole guards are useless if not pushed properly into the ground as voles can get underneath them and push them out of the way.

|  |  |
| --- | --- |
| **Planting** | |
| **Doing the work yourself** | **Using contractors** |
| Tree planting can be very enjoyable work in good weather, on a good site, with good company and with no pressing deadlines.    Tree planting on your own, on a difficult site in a cold wind and torrential rain is very hard work and can be demoralising.    Think very carefully about how many trees you’ll need to plant and how much time is needed. If it’s a big job, can you commit to several weeks of this sort of work?    Remember that it’s a physical task – you’ll need to be reasonably fit to work at any speed. Planting bags are heavy, and there’s a lot of bending over: it’s not a good idea if you’ve got health problems.    Volunteers can help to plant trees especially on smaller sites but be realistic about how motivated they are and how much can be done in poor weather.    For planning purposes, you can assume that a fairly fit, motivated person can plant about 500 trees in a day. You can reduce this figure if there is other work eg guarding trees with tree shelters, marking out the site.    500 trees/day figure means that one person can plant roughly 1ha at 2m spacing in a week (or 1ha at 2.5m spacing in just over three days). Compare these outputs to the size of your planting scheme for a rough idea of how long the work will take. | If you are trying to establish trees on a large site, and do not have a suitable labour force, contractors are a good idea. They will be used to the work and can carry it out more quickly.    Forestry contractors can typically plant over 1,000 trees in a day – some will plant a lot more in good conditions. Remember to plan in additional time for installing guards, shelters etc. At 1,000 trees / day, it would take a contractor two and a half days to plant a hectare at 2m spacing, or just over one and a half days to plant a hectare at 2.5m spacing.    Speak to several contractors; they will give you a better idea of their work rate, and will give a price for the work, based either on a price per tree or the entire job.    You should ensure that the full work specification is agreed in advance in writing. This should include whether you or the contractor supply the trees, the ground conditions (any advanced preparation should be discussed), who is expected to fit guards or shelters, the price for the job and timescales for completion.    Tree planting contractors are in high demand during the planting season so make sure you book their services well in advance. It’s possible that start dates may be delayed by adverse weather (on your site or their previous job) so allow plenty of time. |

The following table will help you to estimate how long planting will take. Firstly you will need an idea of how many trees you can plant in one day (see box above). If you are fitting tree tubes or guards, remember to ***reduce the number*** of trees you’ll plant to allow time to fit the guards. The time required for this will vary according to the type of guard. As a rough guide, ***halve*** the number of trees you will plant if you are fitting guards or tubes as well. If you’re using a contractor, they’ll be able to give you a more accurate estimate of the time required for the type of product you’ll be using. Work rate can be ***improved*** by good ground preparation and advance weed control, marking out the site in advance and dropping off plants and other equipment in a sensible way.

This table should be used as a rough guide only. You should look carefully at your site and allow sufficient time to deal with difficult terrain, moving plants and materials into place, and delays arising from bad weather etc.

|  |  |  |
| --- | --- | --- |
| **No. of trees planted per day.** | **Number of working days needed to plant**  **1ha (2.5 acres)** | |
| **…at 1,600 trees / ha**  **(2.5m spacing)** | **…at 2,500 trees / ha**  **(2m spacing)** |
| 100 | 16.0 | 25.0 |
| 250 | 6.4 | 10.0 |
| 500 | 3.2 | 5.0 |
| 750 | 2.1 | 3.3 |
| 1000 | 1.6 | 2.5 |
| 1250 | 1.3 | 2.0 |
| 1500 | 1.1 | 1.7 |

**How hard can you work?**

The individual ***World Record*** for tree planting is held by Muhammed Yousuf Jamil, a

Lance Corporal in the Pakistani Army. In September 2010 he planted 20,101 trees in a single day. His working day lasted over 18 ½ hours, during which he planted an average of 18 trees per minute.

## 10 Aftercare

It’s important to keep up with care of your trees after they’ve been planted. Most aftercare work is quite straightforward – but if it is neglected, the difficulty and cost increases considerably.

## 10.1 Weeding

Weed control is absolutely vital for the first three years (sometimes longer). As described in **Section 8.2** above, you should aim to keep a weed-free area of 1m diameter around each tree. Doing this will reduce the risk of tree mortality, and ensure a rapid start to growth, reducing the need for costly management later on.

If you’ve used mulching, you may not consider further weed control but:-

* Check the site carefully every few months to be sure the mulch is working
* Sheet mulches and mats may work loose and need re-securing
* Loose mulches (e.g. bark chips) may rot down and need to be topped up
* Check for bramble and other creeping weeds growing over the top of your mulch (these may “choke” the tree and compete with it for light and space)
* Look out for larger weeds growing at the edge of the mulch area. Often physical control (e.g. strimming twice a year) is enough to control these.

Chemical herbicides: there is no single treatment which is effective for the entire length of time necessary for the trees to become established:

* Top-up weed treatments will be necessary, usually twice per year for the first three years (although this varies with soil fertility and weed types).

If mechanical weeding or mowing is part of your strategy, regularly allocate enough time to it.

* Bad weather and other delays can quickly allow weed growth to get out of control
* Mowing or strimming should not be your only method of weed control after tree planting

## 10.2 Monitoring

You need to ensure that the site is fully stocked (this is especially important if you have claimed the Glastir Woodland Creation grant). You may need to ***beat-up*** if you have suffered losses or ***respace*** if you have too many trees. We recommend the following methods as quick, simple ways of monitoring the site and spotting problems.

* Visit your site regularly, and keep an eye open for dead or unhealthy-looking trees. Be on the lookout for discoloured foliage and obvious signs of mammal damage (you’ll need to get on your hands and knees to look for vole damage)
* The occasional dead or damaged tree may be considered normal – but if you suspect a number of trees are struggling, try to identify what is causing the damage and act quickly to stop it.
* Guidance on dealing with most common tree problems is available on the Forestry Commission website; see also **Section 11 References**.
* Remember to look out for natural regeneration; additional self-seeded trees on the site, which may require management. See **Section 10.4** below.
* Every August, take a notebook and walk a few “transects” across your site; this means following an imaginary straight line from one side of the site to the other (the idea is to get a random sample).
  + Examine each tree - if part of it falls within a metre of your imaginary line (you may wish to carry a 2m long stick to speed things up). Record each tree in one of the following three categories: healthy, dying and dead trees and note the species.
  + Calculate the proportion of trees (overall) which are dead or dying
  + If over 10% are struggling, you will need to order some replacements (see “Beating-up” in **Section 10.3** below)
  + If more than 20% are struggling, you should take urgent steps to identify the problem. Begin by asking whether most of the dead trees are of a single species; it could be poorly-suited to the site or there may have been a problem with the planting stock. If you cannot find the cause of the problem, seek specialist advice.
* The method described above is a “quick and simple” approach to recognising there is a problem. Bear in mind that it ***won’t*** tell you the overall stocking density (to check this, you’d need to count trees in sample plots of a measured area).
* On small sites, it may be more practical to check every tree than to carry out sampling. You can use canes to mark locations where trees should be replaced.

## 10.3 Beating-up

Beating-up means replacing trees which have died. This is a normal part of forestry management, as a small proportion of losses are to be expected. Generally the costs aren’t too high. You should always beat-up when losses exceed 10% of the total for any part of the site. It is advisable to carry out a more detailed “beat-up survey” before ordering trees. You could increase the number of transects (described above) for greater accuracy or put in a series of circular sample plots to accurately estimate the number of trees you will need to buy.

* Circular plots for beat-up surveys usually use a plot size of ***5.6m*** ***radius*** which means each plot is equal to 0.01ha. Find the number of live or dead trees per ha by dividing the total for each plot by 0.01, then find the mean average of the results.
* The more plots you do, the greater the accuracy you’ll achieve. Ten plots is normally the minimum used in forestry conditions; you may use fewer if there is not enough room to fit them in without overlapping. If you can only fit a few plots on your site, consider walking the rows and counting individual trees rather than putting in sample plots.
* As with the simple transects, record the number of live and dead trees in each plot and their species. The template in Appendix 12.3 may be useful.
* Circular plots are easier to carry out with two people: One stands in the plot centre and holds the end of the tape measure and records the results; the other person works around the plot calling out whether trees are alive or dead.
* If working alone, a stick stuck into the plot centre can be used to hold the end of a spring-loaded tape; it’s useful to put a dot of spray paint on trees (or guards) that have been examined to avoid double-counting.

**Beating up in Glastir**

- Glastir Woodland Creation grant scheme claimants are responsible for keeping their woodland fully stocked (at the density specified on the contract) for twelve years.

- Claimants ***must*** check the site regularly to ensure that nothing is killing the trees or preventing them from establishing properly. Beat-up planting may be necessary andthe claimant is responsible for identifying any problems and sorting them out.

- Rural Inspectorate Wales may use circular plots to check that the tree numbers on the ground match the number of trees in the Glastir Woodland Creation contract. When a site is inspected and found not to be fully-stocked, the Welsh Government will take action to reclaim new planting grants that have been paid.

## 10.4 Respacing

Respacing means removing unwanted trees to ensure the stocking density is maintained. It may be necessary if there is abundant natural regeneration (self-seeded trees) on a newly planted site. Sometimes the regenerating trees are of a desirable species and a proportion of them can be accepted and allowed to grow along with the planted trees.

In other cases, it is necessary to control the trees where they conflict with the objectives of management. For example, removal of birch regeneration is sometimes necessary where softwood production is the main objective and conifer regeneration should be removed from new native woodlands.

Keep an eye open for natural regeneration during your periodic checks of the site. If you want to quantify the amount of regeneration, you can count the regenerated trees when you carry out your “beat up” survey, see **Section 10.3** above.

The most common method for respacing is using a brushcutter (motor-driven strimmer with metal cutting blade). Larger material may need a chainsaw; very young seedlings can be pulled by hand if you can find them. It’s important to take great care not to damage the planted trees or any natural regeneration that you want to retain.

**Respacing in Glastir**

If you are claiming a grant from the Glastir Woodland Creation scheme, you cannot use naturally regenerated trees as part of the funded scheme: you must ensure that you *plant* the number of trees specified on your contract.

Additional trees which regenerate on the planting site may be retained if they are a desirable species and in an appropriate place – in fact you may want to weed around them to ensure they survive.

## 10.5 Pruning

Pruning of young trees to improve the form of the final tree is called ***formative pruning***. It is an important part of management for broadleaves where growing high quality timber is an objective.

If your intention is to produce high-quality hardwood timber, you will need to carry out some pruning, ideally when the trees are 1m to 1.5m tall (and subsequently as needed). It’s usually not necessary to prune every tree; instead you can concentrate on a proportion of the trees which are relatively good quality, and will grow on to be the “final crop”.

Pruning is traditionally considered a winter job, while the trees are dormant and it’s easy to see the tree’s form. However, timings vary and some species have special requirements.

Detailed advice on pruning is beyond the scope of this guidance - you can find some more information in **Section 11 References**.

**Is pruning necessary?**

If you’re growing broadleaves for biodiversity or landscape reasons, it’s probably unnecessary to prune your trees. There’s no need to prune woody shrubs. Don’t prune for the sake of it – there should always be a reason - and be wary of “tidying up” young woodlands. They aren’t supposed to be tidy.

If you’re growing broadleaves for timber, you should decide on a pruning strategy which is appropriate for the tree species.

Conifer timber crops grown at high stocking densities are not normally pruned very early, but sometimes pruning takes place later on “final crop” trees when these can be identified. At this stage the trees will be taller; pruning can be done up to about 6m height with a long-handled pruning saw.

**You should learn good pruning technique, to prune carefully and at the right time of year.** Over-enthusiastic or poor-quality pruning can kill trees, leaving you with a bill for replacement trees.

## 10.6 Thinning

Thinning means removing a proportion of the trees and is normally carried out to improve timber quality in the remaining crop. It can be a source of revenue from timber sales, or allow the removal of some useful firewood. The first thinning is unlikely to be a profitable operation, particular on small sites.

Conifers and faster-growing broadleaves may be ready for a first thinning after 15-20 years and can then be thinned periodically depending on growth rates, site constraints and the intensity of earlier thinnings.

The management of thinning operations is outside the scope of this guidance as you will not need to thin a new woodland within twelve years of planting. For further information see **Section 11 References.**

**Felling licences**

When your trees have grown, you’ll need a felling licence in order to carry out thin or other felling work. You will normally need a licence for any work which involves felling more than five cubic metres of timber in a calendar quarter (or two cubic metres if any of the material is to be sold).

More information on applying for a felling licence is available from <https://naturalresources.wales/forestry/tree-felling-and-other-regulations/tree-felling-licences>

## 11 References

**Glastir Woodland Creation Rules Booklet** <http://gov.wales/topics/environmentcountryside/farmingandcountryside/farming/>schemes/glastir/glastir-woodland/documents/glastir-woodland-creation-rules-booklet

**Managing Native Broadleaved Woodland (2010)** R. Harmer, G. Kerr & R. Thompson

<http://www.forestry.gov.uk/fr/INFD-89PDQH>

**New Farm Woodlands** – how planting trees can contribute to your farm business[*https://naturalresources.wales/media/2970/new-farm-woodlands*](https://naturalresources.wales/media/2970/new-farm-woodlands)

**Reducing Pesticide Use in Forestry** I. Willoughby *et al.* (2004) <http://www.forestry.gov.uk/pdf/fcpg015.pdf/$FILE/fcpg015.pdf>

**Silvicultural systems**

<https://naturalresources.wales/forestry/planning-for-the-future/silvicultural-systems>

**Tree Species Choice** (tree species diversity) <https://naturalresources.wales/forestry/planning-for-the-future/tree-species-choice>

**Safety information - Treework**

<http://www.hse.gov.uk/treework/>

**UK Forest Standard** - Includes guidance on general forestry practice, and specific guidance on Biodiversity, Climate Change, Historic Environment, Landscape, People, Soil and Water <http://www.forestry.gov.uk/ukfs>

**Special thanks to Rob Marsh, Rob Marsh Woodland Services who write the original Tree Planting Guidance for Forestry Commission Wales in 2011**

## 12 Appendices

## 12.1 Appendix 1: Checklist

Who is in overall charge of planning for the tree planting? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_­­­

Who is in charge of the tree planting budget? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

What is the target date for completion of planting? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| AT THE TIME OF NEW PLANTING | | | | |
| What? | When? | Who? | Budget (£) | Comments |
| Liaise with Glastir Woodland Creation planner |  |  |  |  |
| Sign Glastir Woodland Creation contract |  |  |  |  |
| Plan scheme budget 4.1 |  |  |  |  |
| Plan scheme timing 4.2, 4.4 |  |  |  |  |
| Decision on appropriate:  Tree stock *5.2* |  |  |  |  |
| Tree protection *6* |  |  |  |  |
| Fencing *7* |  |  |  |  |
| Ground preparation *8.1* |  |  |  |  |
| Weed control method *8.2* |  |  |  |  |
| Arrange contractors: confirm work spec, timings & price; confirm details in writing |  |  |  |  |
| Order the trees *5.1, 5.2* |  |  |  |  |
| Order other materials *7* |  |  |  |  |
| Fencing: *Section 6* Arrange contractor or  organise work directly |  |  |  |  |
| Fences to be in in place: |  |  |  |  |
| Gates to be in place: |  |  |  |  |
| Claim fencing grant |  |  |  |  |
| Carry out ground preparation 8.1 |  |  |  |  |
| Carry out pre-planting weed control 8.2 |  |  |  |  |
| Planting operation (inc. installation of guards etc.) *9.1-9.6* |  |  |  |  |
| Claim 1st year planting grants |  |  |  |  |
| Weed control *8.1, 10.1* |  |  |  |  |
| Site check / beat-up survey *10.2* |  |  |  |  |
| Deal with problems & arrange replacement trees *10* |  |  |  |  |
| Beating-up *10.3* |  |  |  |  |
| Respacing *10.4* |  |  |  |  |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| SUBSEQUENT YEARS (Repeat at least in years 2 and 3, and afterwards if needed) | | | | |
| What? | When? | Who? | Budget (£) | Comments |
| Weed control 8.1, 10.1 |  |  |  |  |
| Claim 2nd and 3rd year grants |  |  |  |  |
| Site check / beat-up survey 10.2 |  |  |  |  |
| Deal with problems & arrange replacement  trees 10 |  |  |  |  |
| Weed control (repeat as necessary, depending on method used) 8.1, 10.1 |  |  |  |  |
| Beating-up 10.3 |  |  |  |  |
| Respacing 10.4 |  |  |  |  |

## 12.2 Appendix 2: Glastir Woodland Creation fencing specification

**595 POST AND WIRE FENCING WITH STOCK NETTING**

This technical note describes the minimum standard of work required in order to receive payment for ‘Post and Wire Fencing with Stock Netting’, as specified in your Glastir Contract. Any variation from the standards set out must be approved by the Welsh Government prior to starting the work.

Certain works you may be carrying out under your Glastir Contract may require permission, consent or a license before they are undertaken. You must ensure that you carry out the works in line with the licenses, consents or permissions.

Fencing timber must comprise either hardwood or pressure treated softwood.

*Trees and shrubs must not be used as strainers or fencing posts or to support fencing wire, staples or netting*.

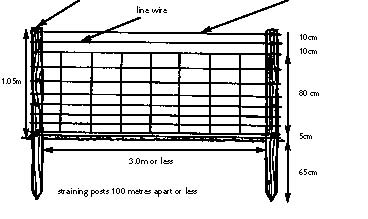
Fencing timbers, line wire, netting and staples used to construct approved fence lines must always consist of new materials. The standard payments include an allowance for the dismantling, removal and safe disposal of existing derelict fences. All materials and construction standards must also conform to the following detailed specifications in addition to British Standards 1722 and 4102.

Post and Wire with Stock Netting

All stock netting must be protected by galvanizing and at least one line wire must be used above the top of the netting. The distance from the ground to the top wire must be no less than 1.05m. In cases where there is heavy pressure from sheep or cattle, a second line wire on top of the netting as well as an additional wire at the bottom should be added.

All netting and wire must be affixed to the posts with galvanized staples.

**Diagram of Post and Wire with Stock Netting**



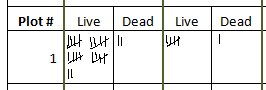
**Intermediate post**

**Top line wire**

## 12.3 Appendix 3: Guide for using New Planting site monitoring template

* Use at least one sheet per planting site or sub-compartment (more than one on very large sites)
* Print as many copies of the template as you'll need
* Before starting, decide which are the four principle species and label the columns Spp.1, Spp.2 etc.
* Carry out a minimum of ten plot samples on each site.
* **Every plot should be 5.6m radius** and all live and dead trees should be counted.

**Example**



* Total the live and dead trees of all species for each plot in "PLOT TOTAL" columns.
* Divide each total by 0.01 to see how this corresponds to trees per ha; enter in the right-hand columns.
* Calculate totals at the bottom of the right-hand column
* Divide the totals by the number of sample plots used (including any "zero" plots), to get the average trees per ha
* Check the average live trees per ha. against your management plan or Glastir Woodland Creation contract.
* This should enable you to see if you have enough live trees on site, and (if necessary) to calculate how many replacements to order.
* For further guidance please see **section 10.3**

Notes on sampling and size of site

* Please note that this sampling method is intended for sites larger than a quarter of a hectare.
* It can be applied on much larger sites: simply put in a larger number of plots to improve accuracy.
* The number of plots required will depend on the site size, and the variability of the tree crop.
* For smaller sites (<0.25ha) it may be easier to walk all the planting rows, counting live and dead trees.

Please note that simplified survey methods are described here, which are suitable for most woodland establishment situations. For surveys of very large and/or complicated sites and commercial plantations, more detailed guidance is available in various publications, notably Forestry Commission Operational Guidance Booklet 4 – [http://www.forestry.gov.uk/pdf/ plantdensitywestenglandsouth.pdf/$FILE/plantdensitywestenglandsouth](http://www.forestry.gov.uk/pdf/%20plantdensitywestenglandsouth.pdf/$FILE/plantdensitywestenglandsouth)

## 12.4 Appendix 4: Guide for using New Planting site monitoring template

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Site ref: | | | | | | | | |  | |  | |  | |
|  | **Spp. 1** | | **Spp. 2** | | **Spp. 3** | | **Spp. 4** | | **All others** | | **PLOT TOTAL** | | **Trees per ha (divide each plot total by 0.01)** | |
| **Plot** | **Live** | **Dead** | **Live** | **Dead** | **Live** | **Dead** | **Live** | **Dead** | **Live** | **Dead** | **Live** | **Dead** | **Live** | **Dead** |
| **1** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **2** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **3** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **4** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **5** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **6** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **7** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **8** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **9** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **10** |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | |  | |  | |  | |  | | Total: | |  |  |

|  |  |
| --- | --- |
|  |  |

**Average trees per Ha**