Level 3 Forest Craftsperson Apprenticeship (ST1321)

Training Specification

February 2025 Release V1

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Introduction

This document provides guidance for the delivery of the Level 3 Forest Craftsperson Apprenticeship based on the approved Standard ST1321 and Assessment Plan. It is for training providers and employers and will set out in more detail what the apprenticeship covers, with outline content based on the knowledge, skills, and behaviours (KSB's) specified in the Forest Craftsperson Occupational Standard against the eighteen duties listed. This apprenticeship has two options, establishment and maintenance and harvesting. The apprentice must complete all the knowledge, skills and behaviours for one of the options.

This document is based on version 1.1. of the Standard. It is the responsibility of the training provider and the employer to make sure the apprentice completes the content in the Standard and the Assessment Plan on the version of the apprenticeship they are following. This document is not a training plan and therefore providers will still need to develop additional resources. It does, however, give more detail to help them know what should be covered.

Mandatory Qualifications

The Forest Craftsperson Standard has mandatory qualifications that must be completed before the apprentice can be put forward for the end test. Elements covered in the mandatory qualifications also in the standard, will still be assessed in the end test. Where content is covered by these qualifications, the apprenticeship will be aligned with them and therefore not duplicated here.

The mandatory qualifications are subject to occasional change and therefore it is crucial that training providers and employers check which Standard version the apprentice is following and cover the qualifications it states. Taking the wrong qualifications can delay the apprentice doing the end test and cause anxiety and additional costs. Version 1.1 of the Standard states:

Level 2 English & Maths- Apprentices without level 2 English and maths will need to achieve this level prior to taking the End-Point Assessment. For those with an education, health and care plan or a legacy statement, the apprenticeship's English and maths minimum requirement is Entry Level 3. A British Sign Language (BSL) qualification is an alternative to the English qualification for those whose primary language is BSL.

Other mandatory qualifications:

- **(Core)** Level 3 award or training and assessment in first aid at work +F or forestry first aid +F or forestry first aid minimum 1 day course (face-to-face), carried out by either an awarding organisation, a UKAS accredited trade body or voluntary aid society recognised by government as specified in HSE document GEIS 3
- **(Core)** Lantra Awards Level 2 Award in Chainsaw Maintenance and Cross-cutting or City & Guilds Level 2 Certificate of Competence in Chainsaw Maintenance and Cross-Cutting

- **(Core)** Lantra Awards Level 2 Award in Felling and Processing Trees up to 380mm or City & Guilds Level 2 Certificate of Competence in Felling Small Trees up to 380mm
- **(Establishment & Maintenance)** Lantra Awards Level 2 Award in Safe Use of Pesticides or City & Guilds Level 2 Principles of Safe handling and application of pesticides (PA1)
- **(Establishment & Maintenance)** Lantra Awards Level 2 Award in the Safe Application of Pesticide Using Hand Held Equipment or City & Guilds Level 2 Award In The Safe Application of Pesticides Using Pedestrian Hand Held Equipment (PA6)
- **(Establishment & Maintenance)** City & Guilds NPTC Level 2 Award in the Safe Use of Brush-cutters and Trimmers
- **(Establishment & Maintenance)** City & Guilds NPTC Level 2 Award in the Safe Use of Forestry Clearing Saws
- **(Harvesting)** Lantra Awards Level 3 Award in Severing Uprooted or Windblown Using a Chainsaw or City & Guilds Level 3 Certificate of Competence in Individual Windblown Trees.
- **(Harvesting)** Lantra Awards Level 3 Award in Felling and Processing Trees over 380mm or City & Guilds Level 3 Certificate of Competence in Felling and Processing Trees Over 380mm and up to 760mm

Assessment overview

This apprenticeship has three assessment methods:

- a practical assessment with questions
- a multiple-choice test
- a professional discussion underpinned by a portfolio of evidence.

The Assessment Plan lists the knowledge, skills and behaviours as specified in the Forest Craftsperson Standard and how each of them will be assessed in the End Point Assessment (EPA). It also contains the grade descriptors and details about each of the tests.

Unit List - Core

Duty 1: Implement health and safety legislation, industry guidance and organisational policies

What is this duty about?

The purpose of this unit is for learners to understand the principles and importance of health and safety within forestry. Working in forestry is exciting and varied, but operating in these environments can present potential risks and hazards. Apprentices will cover health and safety legislation, the requirements for risk assessment, industry guidance and how these impact on working practices.

The learner is introduced to the basic requirements legislation such as fire prevention, control of substances, safe manual handling and basic first aid.

Learning outcomes

In this unit, apprentices will be able to

1.1 Understand legislation, risk assessment, safe working methods, policies, procedures
1.2 Understand forestry and the environment

Learning outcome 1.1: Understand legislation, risk assessment, safe working methods, policies, procedures

All forestry tasks have elements of risk and are therefore subject to rules, regulations, guidelines, and industry best practice relating to Health and Safety. This covers the key activities that monitor and maintain good health and safety practices in the workplace.

Topics

1.1.1 Key legislation relating to health, safety and welfare
1.1.2 Risk assessment
1.1.3 Safe working methods, policies and procedures
1.1.4 Incidents and accidents
1.1.5 Consequences of not complying with statutory duties
1.1.6 How individuals can contribute to establishing a good health and safety culture

Topic 1.1.1 Key legislation relating to health, safety, and welfare

The main legal duties of the employer for health and safety under current legislation:

- Healthy work environment
- Training
- Provision of personal protective equipment (PPE)
- Provision of suitable guarding on machinery
- Equipment fit for purpose
- Reporting

The main legal duties and any additional responsibilities of workers in relation to health and safety such as:

- Responsibility for own personal health and safety
- Co-operation with employer
- Not interfering with or misusing equipment/provisions (e.g., alarms, signage) provided for health, safety, and welfare
- Lines of reporting for; accidents, faults, damage
- Following instructions and safe working practice (using PPE where provided)
- Helping others and sharing good practice
- Appreciate the role of industry bodies

Range of legislation and industry good practice:

- Health and Safety at Work Act (HASAW) (1974)
- Management of Health and Safety at Work Regulations (1999)
- Provision and Use of Work Equipment Regulations (PUWER) (1998)
- Control of Substances Hazardous to Health Regulations (COSHH) (2002)
- Manual Handling Operations Regulations (1992) (as amended)
- Personal Protective Equipment (PPE) at Work Regulations (1992)
- Control of Noise at Work Regulations (2005)
- Control of Vibration at Work Regulations (2005)
- Lifting Operations and Lifting Equipment Regulations (LOLER) (1998)
- Workplace (Health, Safety and Welfare) Regulations 1992
- Work at Height Regulations 2005
- Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995
- Forestry Industry Safety Accord (FISA)
- Arboricultural Forestry Advisory Group (AFAG)

Topic 1.1.2 Risk Assessment

Be able to:

- Prepare a risk assessment for a site
- Follow set procedures and requirements for safe systems of work relating to health and safety in the workplace
- Identify any significant risks to health and safety in the workplace, take action to control the risks where possible or seek guidance from an appropriate person
- Monitor changes to risk and update risk assessment and mitigation methods accordingly

Know and understand:

- The main areas of risk in the work environment and the control measures and safe systems of work put in place to control these
- How to identify health and safety hazards
- Who to seek guidance from with regard to health and safety
- The range of alternative and complementary measures to control risks e.g., guarding machinery, personal protective equipment, instruction, and training

- The risks of personal injury, contracting disease or other health problems associated with work and how these can be minimised
- The risks of injury associated with lifting and handling and how these can be reduced e.g. mechanical handling aids, safe lifting techniques
- Know and understand the hierarchy of risk control:
  - Elimination
  - Substitution
  - Safe working procedures
  - Training, instruction, and supervision
  - Personal protective equipment (PPE)
- Understand implications of changes in conditions, situations and working environments and actions that should be taken to mitigate any new risks

Topic 1.1.3 Safe Working methods, policies, and procedures

Be able to:

- Work in a way that minimises risks to self and others
- Use safe methods of lifting and handling
- Use, handle and store equipment and materials correctly according to instructions and relevant legislation
- Use, handle, and store potentially hazardous substances correctly in accordance with instructions and legislation
- Deal with waste safely and correctly in accordance with instructions and relevant legal requirements
- Wear appropriate clothing and protective equipment for the work to be undertaken.
- Ensure a good standard of hygiene is always maintained
- Follow appropriate procedures when working alone or at risk of abuse
- Stop work immediately if it becomes apparent there is a danger of accident or injury and take the appropriate action
- Follow procedures safely, correctly and without delay in an emergency

Know and understand:

- Safe methods of using, handling, and storing equipment and materials
- The importance of maintaining machinery and equipment in good working order and operating safely in accordance with instructions
- Safe use, handling, and storage of potentially hazardous substances e.g., COSHH
- How hazardous and non-hazardous waste should be dealt with
- Appropriate clothing and protective equipment for different work activities
- The importance of good hygiene
- The risks to others from work activities including members of the public, children, visitors, contractors
- The risks of working in isolation or in remote locations and the need for safe systems of work and emergency procedures

Topic 1.1.4 Incidents and accidents

Know and understand:

- The effects that work-related accidents, incidents, and ill health can have on people and businesses
- The need to communicate health and safety precautions to others
- The types of accidents or injury that may occur in the forestry workplace and how these can be avoided
- The actions to take for different types of emergencies in the relevant area of work including accidents, incidents and near misses.
- Records that need to be maintained

Recording information and methods:

- Report accidents, incidents and near misses in accordance with instructions
- Record information as required
- Who to report the information to e.g., HSE using RIDDOR.

Topic 1.1.5 Consequences of not complying with statutory duties

Learners will know the powers of health and safety enforcement officers (e.g. inspection, investigation, and guidance) and identify the range of enforcement actions and penalties that may be imposed (e.g. prohibition and improvement notices, intervention fee and prosecutions).

Topic 1.1.6 How individuals can contribute to establishing a good health and safety culture

- Prompt reporting of defective safety equipment or other matters of concern
- Always use control measures and personal protective equipment (PPE) as instructed
- Help others to work safely by sharing knowledge and good practice
- Set a good example to others by always working safely
- Follow instructions and safe working procedures

Learning outcome 1.2: Understand forestry and the environment.

This outcome will look at the legislation and systems to ensure that the environment and ecosystems of the forest are protected and not adversely affected by forest operations.

Topics

1.2.1 Forestry legislation and codes of practice
1.2.2 Environmental and ecological surveys
1.2.3 Pollution and climate changes

Topic 1.2.1 Forestry legislation and codes of practice

Know and understand current UK legislation relevant to Forestry & the Environment e.g.

- European Protected Species (1994)
- Wildlife and Countryside Act (1981)
- Countryside Rights of Way Act (2000)
- Hedgerow Regulations (1997)

Know and understand UK codes of practice relevant to Forestry & the Environment:

- UK Woodland Assurance Standard (UKWAS)
    - Forests and Biodiversity
    - Forests and Climate Change
    - Forests and Historic Environment
    - Forests and Landscape
    - Forests and People
    - Forests and Water

Topic 1.2.2 Environmental and Ecological surveys

Be able to:

- Be involved in producing an environmental risk assessment
- Be involved in implementing forest operations which follow current UK legislation and industry best practice
- Take part in ecological surveys that will enable the implementation of appropriate forest management
- Give due consideration to the environmental implications of undertaking their duties in the office or in the field

Know and understand:

- The potential impacts of the work on the environment and how these can be minimised, including European Protected Species and sensitive habitats
- Have a basic understanding of and the reasons for producing an environmental risk assessment

Topic 1.2.3 Pollution and Climate Changes

Understand the effects of pollution on the forest environment:

- Loss of habitat
- Pollution of water courses
- Decline in plant and animal species

Understand the effects of climate change on the forest environment:

- Loss of habitat
- Loss of plant and animal species
- Loss of timber production
- Selection of tree species tolerant to climate change

Suggested learning resources

- Approved Codes of Practice issued by the Health & Safety Executive in relation to legislation
- Forest Industry Safety Accord (FISA) Safety Guides
- Arboriculture and Forestry Advisory Group (AFAG) Safety Guides
- UK Forestry Standard (UKFS) (an overview and appropriate level understanding of)

Journals and magazines

- Forestry and British Timber
- Forestry Journal

Websites

- Health and Safety Executive (HSE) www.hse.gov.uk
- Forest Industry Safety Accord www.ukfisa.com
- UK Forestry Standard www.forestry.gov.uk/ukfs
- The Royal Society for the Prevention of Accidents (ROSPA) www.rospa.com

Duty 2: Implement biosecurity legislation, industry guidance and organisational policies

What is this unit about?

Biosecurity within the forestry industry is important as the range of pests and diseases is ever increasing within the United Kingdom. It looks at the legislation, industry guidance and organisational policies in place to implement biosecurity.

Learning outcomes

Learners will be able to

2.1 Understand Biosecurity legislation, industry guidance and organisational policies and how carry it out.

Learning outcome 2.1: Understand Biosecurity legislation, industry guidance and organisational policies and carry it out.

Topics:

2.1.1 Plant health legislation and policies
2.1.2 Biosecurity methods
2.1.3 Plant health reporting

People in forestry are at high risk of spreading pests and diseases. They encounter infected material, work at multiple sites and transport tools and material that can carry pests and diseases. By undertaking basic biosecurity every day these risks can be minimised.

Topic 2.1.1 Plant health legislation and policies

Know and understand:

- Legislative requirements relating to plant health.
- The features of a high-risk situation and what additional actions may be necessary.

Topic 2.1.2 Biosecurity measures

Be able to:

- Undertake routine biosecurity measures such as removing debris and soil from clothing, vehicles, and machinery before leaving a site
- Cleaning and disinfecting chainsaws and other cutting tools during maintenance
- Use a biosecurity kit
- Correctly disposes of infected waste

Know and understand:

- The definition and principals of biosecurity
- The importance of biosecurity from an environmental, social, and financial perspective
- Ways that pests and diseases can be dispersed geographically and means of dispersal in the forestry sector
- The importance of a responsible source of trees

Topic 2.1.3 Plant health reporting

Be able to:

- Report pests and diseases to correct authority

Suggested learning resources

Books

- Guidance by the Health & Safety Executive in relation to biosecurity.
- Forest Industry Safety Accord (FISA) Safety Guides
- Arboriculture and Forestry Advisory Group (AFAG) Safety Guides
- UK Forestry Standard (UKFS) (an overview and appropriate level understanding of)
- Biosecurity in Forestry Z Card

Journals and magazines

- Forestry and British Timber
- Forestry Journal

Websites

Health and Safety Executive (HSE)	www.hse.gov.uk
Forest Industry Safety Accord	www.ukfisa.com
UK Forestry Standard	www.forestry.gov.uk/ukfs
Biosecurity in Forestry	https://forestry.gov.uk/biosecurity
Forest Research	https://www.forestresearch.gov.uk/

Duty 3: Implement pollution control in line with legislation, industry guidance and organisational policies

What is this unit about?

The legislation and guidance relating to pollution, how to avoid pollution incidents but if they occur how to deal with them correctly and who to report them to as well as the information that needs to be recorded.

Learning outcomes

Learners will be able to

3.1 Understand Pollution legislation, industry guidance and organisational policies and how to prevent incidents and manage them if they occur.

Learning outcome 3.1: Understand Pollution legislation, industry guidance and organisational policies and how to prevent incidents and manage them if they occur

This includes avoidance and control of local pollution incidents involving oils, fuel, chemicals, and sediment.

Topics

3.1.1 Pollution control legislation and policies
3.1.2 Pollution incidents
3.1.3 Pollution control reporting and record keeping

Topic 3.1.1 Pollution control legislation and policies

Be able to:

- Ensure that relevant legislative and an organisations environmental requirements are met including the requirement to contact the water regulatory authorities regarding pollution incidents.

Know and understand:

- The penalties for causing pollution.
- Responsibilities under current environmental, health and safety legislation and codes of practices

Topic 3.1.2 Pollution incidents

Be able to:

- Identify the potential nature, extent and impacts of pollution incidents including preventative measures.
- Treat the pollution incident using the most appropriate method and materials and following agreed pollution control procedures.

- Note any changes to the scale or nature of the incident and report these changes to the designated person.
- Maintain equipment and machinery used within pollution control in line with manufacturer's instructions.
- Maintain effective communication with colleagues and other agencies.
- Dispose of used pollution control materials in line with specified procedures.

Know and understand:

- How to identify hazards and assess risks
- How to interpret risk assessments
- Emergency planning and procedures
- The chain of command and roles of personnel in a pollution incident
- Agreed pollution control measures.
- How high pressure, low water volume sprays are used in controlling pollution incidents and pollutants.
- The impact of fuels, oils, chemicals, and silt as pollutants
- Equipment and machinery that can be used to help control pollution incidents.
- The implications of terrain, ground conditions, vegetation type, season, and weather on pollution incidents
- How to dispose of pollution control materials
- The use of absorbent materials to control surface borne pollutants.

Topic 3.1.3 Pollution control reporting and record keeping

Keep accurate and up-to-date records as required by legislation and the organisation.

Always maintain the health and safety of self and others in accordance with legislation.

Suggested learning resources

- Guidance by the Health & Safety Executive in relation to biosecurity.
- Forest Industry Safety Accord (FISA) Safety Guides
- Arboriculture and Forestry Advisory Group (AFAG) Safety Guides
- UK Forestry Standard (UKFS) (an overview and appropriate level of understanding)
- Biosecurity in Forestry Z Card
- Managing forest operations to protect the water environment- Operator cab card.

Journals and magazines

- Forestry and British Timber
- Forestry Journal

Websites

- Health and Safety Executive (HSE) www.hse.gov.uk
- Forest Industry Safety Accord www.ukfisa.com
- UK Forestry Standard www.forestry.gov.uk/ukfs
- Biosecurity in Forestry https://forestry.gov.uk/biosecurity
- Environment Agency www.gov.uk/government/organisations/environment-agency

Duty 4: Plant trees

What is this duty about?

This duty covers the following key subject areas:

- The identification of the forest and woodland tree species and associated plants found in the UK.
- The principles of silviculture including a range of silvicultural systems.
- Planting, receiving, handling plant materials, planting, and post planting protection.

Identification of common tree and plant species associated with woodlands and forests is required for many activities that the Forest Craftsperson may undertake in their role. Also covered is the structure of trees and plants, how they function and their lifecycles.

The learner will be able to use various sources of information and different plant characteristics to accurately identify a range of trees species and associated plants.

Learners should be able to accurately identify 30 common species of tree and 10 species of associated woodland plants. (There is a list of suggested species at the end of this Duty).

The learners should be able to accurately identify the specimens from either pressed, or live specimens and images. The specimens and images should have clearly visible characteristics that will help the learner to identify the specimen.

The specimens and images should demonstrate a range of diagnostic features such as habitat, leaves, buds, bark, fruit, growth habit and timber.

For each species, the learner should be able to indicate the how the tree grows, what environment it prefers, and the timber quality and uses.

Silvicultural practices include a range of methods and techniques for successful management of forest stands, including site preparation, planting, or natural regeneration of seedlings, tending and pest control until the plantation is "free to grow;" maintenance and pruning; thinning; pre-commercial spacing and commercial thinning and harvesting.

A silvicultural system is a planned program of silvicultural practices applied throughout the life of the stand of trees to achieve set structural objectives based on management goals. It covers all activities for the entire length of a rotation or cutting cycle. The main objective of conventional silvicultural systems has been to create appropriate conditions for growing selected tree species. Silvicultural systems are named by the harvesting method used to achieve that objective.

This duty covers tree planting, taking delivery handling and storage of trees/plants and other materials and checking that they meet the specification. It describes planting trees to a given specification. Providing after care to trees once planted is also covered to help the tree establish. It is particularly relevant to establishment and maintenance specialists.

The duty also covers maintenance and aftercare of trees.

Protection of the tree from a range of damaging agents such as insects, mammals, and the weather is also included. Types of protection may include tree guards, mulching, fencing, netting, staking, guards and quills, underground systems, and population control.

The management or control of pest populations is **not** included.

Learning outcomes

In this unit, learners will be able to

4.1 Identify trees and associated plants
4.2 Explain the principles of silviculture
4.3 Plant trees

Learning outcome 4.1 Identify trees and associated plants

Topics

4.1.1 Identify common tree species growing in the UK, and plant species associated with growing trees from samples
4.1.2 Processes of plant physiology and anatomy
4.1.3 Life cycle of plants
4.1.4 Describe the preferred growing conditions of tree species
4.1.5 Describe the different timber uses of tree species
4.1.6 Explain the effects that tree properties have on the type of work that is carried out on them

Topic 4.1.1 Identify common tree species growing in the UK, and plant species associated with growing trees from samples

Basic principles of botanical classification and nomenclature. Learners should:

- Be familiar with the basic principles of taxonomic classification, and the binomial system
- Be able to accurately identify 30 common species of tree that may be found in UK woodlands
- Be able to use the scientific names of the identified trees and be able to explain what the names mean with reference to genus and species
- Be able to understand inter- generic, and inter- species hybrids and the accepted conventions associated with recording these, (for example, inter- generic hybrid Leyland Cypress (x *Cupressocyparis leylandii*) and inter-species hybrid *Platanus* x *hispanica*)
- Be familiar with using associated terms such as form, cultivar, variety, sub- species

Identification features. The learner should:

- Be familiar with basic leaf types and shapes using terms such as serrated, entire, simple, compound, lobed, palmate, and the arrangement of leaves in aiding identification such as opposite and alternate.

- Have a good knowledge of other tree identification features such as.
    - Leaf and bud characteristics and arrangement
    - Bark and stems- colour and form
    - Growth habit- conical, broadly spreading, columnar, prostrate etc.
    - Flowers
    - Seeds and Fruit- shapes and edibility
    - Tree size at maturity- very large or small
    - Timber- colour, texture, odour

Associated plants: the learner should be able to:

- identify 10 species of plants intimately associated with woodlands and be able to explain what the relationship is using terms such as indicator species, endophyte, and parasite, and give an indication of what effect the species may have on a tree at different points in its life cycle. There is a suggested list at the end of this Duty.

Topic 4.1.2 Processes of plant physiology and anatomy

Learners will understand the major processes of plant physiology:

- photosynthesis: process and equation for photosynthesis, chloroplasts, function of chlorophyll, functionality of guard cells and stomata, factors influencing the rate of photosynthesis (light, chlorophyll, temperature, carbon dioxide, water, leaf colour)
- respiration: definition of aerobic and anaerobic respiration, equation for aerobic respiration, structure and function of mitochondria, diffusion, compensation point, factors influencing the rate of respiration (temperature, water availability, seasonal growth)
- uptake, transport and loss of water and nutrients: osmosis, diffusion, plasmolysis, turgor, translocation, transpiration, factors influencing transpiration (e.g. temperature, humidity, air movement, water supply, light, stomata)
- Tree and plant structures e.g. xylem, phloem, tracheid's, cambium, epidermis, sapwood, heartwood, leaf structure and types, root structure.

Topic 4.1.3 Life cycles of plants

Learners will understand the life cycle of plants:

- life cycle types: ephemeral, annual, biennial, perennial
- germination: process and stages, types of germination (e.g. epigeal, hypogeal), types of reproduction (sexual reproduction e.g. flower structures, pollination and fertilisation, seed production, dispersal), (asexual reproduction e.g. vegetative propagation, parthenogenesis)

Topic 4.1.4 Describe the preferred growing conditions of tree species

Soil. Learners will:

- Identify a range of soil types to include loams, clays, silts, sands, organic soils, and understand how soil is formed.

- Investigate the characteristics of a range of soil types and profiles to include:
    - soil profiles and different horizons
    - properties of soil particles and texture (clay, silt, and sand)
    - soil structure (i.e. crumb structure, aggregate sizes)
    - water holding capacity
    - aeration
    - stability
    - organic matter
    - pH
    - soil life: decomposers, mycorrhizae

- Understand how soil properties and characteristics can affect plant growth and development, to include:
    - rooting depth and plant stability
    - pH and organic matter
    - availability or lack of macronutrients and micronutrients
    - effects of organic and inorganic fertiliser application
    - nutrient retention to include cation exchange capacity
    - drainage/water logging
    - compaction/poor aeration
    - effects of high or low soil water content
    - effects on ability to prepare soil for planting

- Understand how cultural techniques affect soil structure, to include:
    - Soil amelioration (e.g. green manure, addition of lime, organic matter, hydrogels, mycorrhizae, textural amendment)
    - Soil cultivation (e.g. sub-soiling, ploughing, single and double digging, rotavating, minimal cultivation, zero cultivation)
    - Soil protection and prevention of damage (e.g. capping, erosion, cultivation pans, surface, and subsurface compaction

- Be able to describe what impact light has on trees. They will then be able to give examples of species that have differing tolerances of light levels. They will be able to describe what impact light levels have on tree growth, and why some species are able to tolerate different light levels in a woodland.

- Understand what a mycorrhizal association is, and how establishing this association benefits the tree.

Topic 4.1.5 Describe the different timber uses of tree species:

- Learners will be able to explain how durable some species of trees are and why. For instance, the learner will be able to describe heartwood formation in some species, and why this would be used, for instance, in the cladding of buildings.
- Learners will be able to give some indication of the varying strengths of timber, and how these impact on what that timber is used for.

- Learners will demonstrate understanding of how tree growth rates impact upon its uses. Why are some species grown in preference to others? Why are fast growing species preferred in some circumstances? What impact does growth rate have on timber quality?
- Leaners will know what different timbers are used for example:
    - Oak, Ash and Beech for furniture and flooring
    - Sweet Chestnut for fencing
    - Larch, Fir and Spruce for construction market
    - Willow for cricket bats

Topic 4.1.6 Explain the effects that tree type and timber properties have on the type of work that is carried out on them:

- Learners will understand how tree type (conifer or broadleaf) and timber use (softwood or hardwood) will dictate how you would work with trees.
- The learner will know different tree types, and how they react to silvicultural interventions.
- The learner will explain what effect silvicultural operations will have on both slow and fast-growing species. They will refer to the tree's response to heavy pruning, and how that will impact on the growth rate and form.
- The learner will describe how silvicultural operations can impact on a tree at different stages of its life cycle.

Suggested tree and plant species

Plants

Bluebell (*Hyacinthoides non-scripta*)
Bracken (*Pteridium aquilinum*)
Bramble (*Rubus fruticosus*)
Broomrape (*Orobanche* spp.)
Butchers Broom (*Ruscus aculeatus*)
Clematis (*Clematis vitalba*)
Elderberry (*Sambucus nigra*)
Foxglove (*Digitalis purpurea*)
Gorse (*Ulex europaeus*)
Grass (various species)
Honeysuckle (*Lonicera periclymenum*)
Ivy (*Hedera helix*)
Mistletoe (*Viscum album*)
Oxlip (*Primula elatior*)
Polypody Ferns (*Polypodium vulgare*)
Rose (*Rosa* spp.)
Wild Garlic (*Allium ursinum*)

Broadleaf Trees

Apple (Malus domestica)
Blackthorn (Prunus spinosa)
Common Alder (*Alnus glutinosa*)
Common Alder (*Alnus glutinosa*)
Common Ash (Fraxinus excelsior)
Common Beech (*Fagus sylvatica*)
Common Hawthorn (*Crataegus monogyna*)
Common Hazel (Corylus avellana)
Common Lime (*Tilia* x *europaea*)
Crack Willow (*Salix fragilis*)
Elder (Sambucus nigra)
English Elm (*Ulmus procera*)
English Oak (*Quercus robur*)
Field Maple (*Acer campestre*)
Goat Willow (*Salix caprea*)
Holly (Ilex aquifolium)

Broadleaf Trees Continued

Hornbeam (Carpinus betulus)
Horse Chestnut (Aesculus hippocastanum)
Hybrid Black Poplar (*Populus* x *canadensis*)
Lombardy Poplar (*Populus nigra* 'Italica')
Raoul (Nothofagus procera)
Roble Beech (Nothofagus obliqua)
Rowan (Sorbus aucuparia)
Sessile Oak (Quercus petraea)
Silver Birch (*Betula pendula*)
Small leaved Lime (*Tilia cordata*)
Sweet Chestnut (*Castanea sativa*)
Sycamore (Acer pseudoplatanus)
Turkey Oak (Quercus cerris)
White Willow (*Salix alba*)
Wych Elm (Ulmus glabra)

Conifers

Blue Spruce (*Picea pungens*)
Coast Redwood (Sequoia sempervirens)
Common Silver Fir (*Abies alba*)
Common Yew (*Taxus baccata*)
Corsican Pine (*Pinus nigra* Var. *maritima*)
Douglas Fir (Pseudotsuga menziessii)
Eastern Hemlock (*Tsuga canadensis*)
European Larch (*Larix decidua*)
Giant Redwood (Seqiouadendron giganteum)
Grand Fir (Abies grandis)
Hybrid Larch (*Larix* × *marschlinsii*)
Japanese Larch (*Larix kaempferi*)
Leyland Cypress (× Cupressocyparis leylandii)
Lodgepole Pine (*Pinus contorta*)
Monterey Cypress (Cupressus macrocarpa)
Monterey Pine (*Pinus radiata*)
Noble Fir (Abies procera)
Norway Spruce (*Picea abies*)
Scot's Pine (Pinus sylvestris)
Sitka Spruce (Picea sitchensis)
Western Hemlock (*Tsuga heterophylla*)
Western Red Cedar (*Thuja plicata*)

Learning outcome 4.2 Explain the principles of Silviculture

Topics:

4.2.1 Silviculture practices in the UK
4.2.2 Managing woodland in accordance with UK Forestry Standards (UKFS)

Topic 4.2.1 The main silvicultural practices used in UK forestry:

Silviculture definition:

- The practice of controlling the establishment, growth, composition, health, and quality of forests to meet diverse needs and values.
- The art and science of growing trees in forests.

Different seedling types used in plantation establishment:

- Bare root
- Transplants
- Container grown
- Plugs
- Paper pots

A range of factors that influence the choice of species, including biological, ecological, and economic:

- Site type and characteristics
- Planting specification
- Soil type
- Plant type (bare root/container)
- Planting method
- New planting or re-stock
- Aesthetics
- Owner objectives
- Stock availability
- Local ecology

The need for site preparation and drainage of forest sites:

- Dealing with harvesting residues
- Pre-establishment weed control
- Soil manipulation for drainage
- Break up pans
- Minimal site disturbance

Methods for protecting seedlings at the time of establishment:

- Weed control
- Protection from pests and diseases
- Guards and fencing

The key requirements for successful establishment of forest stands by planting or natural regeneration:

- Stock health
- Establishment method
- Species choice
- Stocking density
- Use of decision support tools such as Environmental Site Classification (ESC)

The structural components of a forest stand, in terms of canopy layers and tree size classes:

- High forest systems
- Even aged/uniform/regular
- Uneven aged/irregular
- Species mixtures
- Nurse crops
- Under planting
- Direct seeding
- Coppice systems

Thinning regimes used in UK forestry:

- Pre-commercial
- Systematic
- Selective
- Low
- Intermediate
- Crown thinning

The main silvicultural systems in UK forestry:

- Coppice
- Coppice with standards
- Clear fell (Clear cutting)
- Selection System
- Group System
- Strip system
- Shelterwood system
- Agroforestry system
- Continuous cover

The difference between rotation and cutting cycle:

- Economic rotation
- Short rotation
- Coppice
- Thinning cycles

The uses and benefits of rides, glades paths and other open space which can be managed as part of a plan for the silviculture of a forest stand:

- Access
- Protection of archaeology
- Protection of habitat
- Protection of species
- Recreation
- Shooting

- Deer control
- Biodiversity
- Water protection
- Landscape and visual amenity

Topic 4.2.2 Managing woodland in accordance with the UK Forest Standard (UKFS):

The UKFS sets out the UK governments requirements for sustainable forest management in the UK. Understand that sustainable forest management is the stewardship and use of forests and forest lands in a way and at a rate that:

- maintains their biodiversity, productivity, regeneration capacity and vitality
- maintains their potential to fulfil, now and in the future, relevant ecological, economic and social functions at local, national and global levels,
- that does not cause damage to other ecosystems.

Explain the importance and value of the UKFS for:

- Compliance
- Meeting legal requirements
- Good practice in terms of:
  - Sustainable forest management
  - Standards and requirements
  - Regulation and monitoring
  - Climate change
  - Biodiversity
  - Protection of water resources
  - Historic environment
  - Landscape
  - People

Learning outcome 4.5 Plant Trees

Topics:

4.5.1 Check plants and materials
4.5.2 Transport and storing plants and materials
4.5.3 Plant trees
4.5.4 Post planting protection

Topic 4.5.1 Check plants and materials

Check condition and species of tree in line with planting specification:

- Ensure the right stock type and species of tree for the planting plan
- Tree health and biosecurity checks

Check the biosecurity and condition of plants and materials:

- Check the roots for pest and diseases
- Check that there are healthy buds
- Ensure they have come from good nursery stock.
- Ensure all tools are fit for use.
- They have had bio-security measures e.g., Disinfected

Report any defects in plants and materials to the relevant person.

- Line manager
- Supervisor

How to interpret specifications and relevant documents:

- Risk assessment
- Planting plans
- Planting specifications
- Stocking density and depth

How to assess the condition of plants and materials against specification:

- Good health and vigour
- Evidence of pest or disease presence

How to recognise healthy plants:

- Identify common pest and diseases in trees
- Good root systems
- Buds
- Needle loss
- Size and quality
- Form and vigour

How to handle and plant different types of plant material to maintain stock in good condition:

- Tying down
- Covering
- Avoid damage to apical bud
- Heeling in
- Cold storage
- Bags

How to check the condition and biosecurity of these trees to ensure they are fit for establishment:

- Monitoring systems and procedures
- Quarantine
- Sterilisation of equipment, clothing, and vehicles
- Population control
- Sanitary felling
- Plant passport

Implications of healthy tree stock on successful establishment and end product.

Topic 4.5.2 Transport and store plant materials

Transporting and storing plants and materials in a manner which minimises damage to the plants and ensures safety and security:

- Securely loaded and stored in suitable trailers and vehicles
- Use and types of planting bags
- Plant protection, for example exposure to wind, sun, frost

Handling plant material minimising damage and optimising growth:

- Distributing plants on site.
- Understanding planting schemes, minimising handling

Keeping accurate, legible, and complete records of deliveries.

- recording and implementation of the results, as well as communication to others who may be affected
- reviewing risk assessments

Transporting planting stock and materials in accordance with the planting specification.

- Cuttings
- Transplants
- Whips
- Feathered
- Standards
- Bare root
- Containerised and cell grown

How to handle and store different types of plants, stock, and materials to maintain them in good condition:

- Seedlings
- Cuttings
- Transplants
- Whips
- Feathered
- Standards
- Bare root
- Containerised and cell grown

How to avoid plant shock and damage when handling, transporting, and storing:

- Temperature
- Wind
- Over watering
- Exposure to disease
- Drying out

Why it is important to maintain safety and security of equipment and vehicles when on site:

- Health and Safety
- Keep the public and staff safe
- Equipment does not get vandalised or stolen
- Lessen the environmental impact or damage

How to choose the right quality, compatibility, size, and species of stock and implications of poor selection on end product and establishement:

- Species
- Soil type
- Aspect
- Topography
- Local climate
- Cost

Topic 4.5.3 Plant Trees

Assessing the risks associated with the site and the proposed planting works:

- Carry out a risk assessment
- Learners will know common hazards associated with a workplace which could result in serious harm to themselves or others (e.g. visitors, colleagues, members of the public)

Selecting and implementing appropriate working method in accordance with the assessed risks:

- Carry out the operations in a manner that reduced environmental damage
- Routine biosecurity control measures

Responsibilities under current environmental, health and safety legislation and codes of practice:

- Health and Safety and Work Act
- Environmental Protection Act 1990
- Food & Environmental Protection Act 1995
- Wildlife & Countryside Act 1981

The responsibilities of the landowner:

- Provide a safe working environment
- Inform the workers of any hazards that might be in the area
- Keep within health and safety regulations

The potential impacts of activities on the environment and how these can be minimised in line with the UK Forest Standard:

- Damaging water courses
- Rights of way and public excess
- Fines if damage is caused
- Wildlife and Countryside Act

Plant trees in line with the planting specification:

- Cell grown and containerised
- Bare root

Topic 4.5.4 Post planting protection

Provide support and protection to trees, as per the specification and size of stock:

- Tree tubes and canes
- Staking
- Fencing
- Mulching
- Rabbit spirals and tree-shelters
- Guards

Carrying out plant protection in line with the specification avoiding damage to the planted trees and to the environment:

- Ride maintenance
- Thinning
- Pruning
- Pest control

Removing and disposing of all waste and surplus materials as specified:

- Chipping
- Removal of waste
- Habitat piles

How to select suitable support systems where required in accordance with:

- Tree type
- Age
- Situation
- Ground conditions
- Cost

The problems and aftercare requirements of newly planted trees to ensure successful establishment and quality crop:

- Monitoring
- Pest control
- Beating-up
- Irrigation
- Mulching
- Drainage
- Formative pruning

The appropriate records to be kept and their significance:

- Planting records
- Diseases control / tracking plants growth
- Pruning and thinning plans

Damaging agents and how to protect against them:

- Wind, frost, sun, and lack of water
- Pest and Diseases
- Vandalism

Suggested learning resources

Tree Identification books:

Collins Tree Guide	David More	ISBN: 978 0 007207 71 8
Trees in Britain	Roger Phillips	ISBN:978 0 330254 80 9
Trees (Eyewitness Guide)	Allen Coombes	ISBN:0- 86318-812-5
Trees of Britain and Northern Europe	Allan Mitchell	ISBN:978 0 713672 38 1

Tree Biology books:

Trees	Roland Ennos	ISBN:0-565-09160-3
Trees- Their Natural History	Peter A. Thomas	ISBN:978-0-521-13358-6

Woodland books:

Woodlands	Oliver Rackham	ISBN:0-00-720244-X

British Standards:

BS 3998	BSI	ISBN:978 0 580 53777 6
BS 5837	BSI	ISBN:978 0 580 69917 7

Botanical names and Taxonomy:

Plant Names Explained	Jane Sterndale- Bennet	ISBN: 13: 978 0 7153 2188 1
The Names of Plants	David Gledhill	ISBN: 0 521 52340 0

Websites:

Arboricultural Association	www.trees.org.uk
Forestry Commission	www.forestry.gov.uk
Tree Council	www.treecouncil.org.uk
Ancient Tree Forum	www.ancient-tree-forum.org.uk
The Woodland Trust	www.woodlandtrust.org.uk
Royal Forestry Society	www.rfs.org

Silviculture books:

Anon. 2006. Field Guide to the Trees and Shrubs of Britain. Reader's Digest. ISBN 0276425073 Agate E. 2000. Tool care: A Maintenance and Workshop Manual. BTCV, ISBN 0946752249 Agate E. 2001. Fencing: A Practical Handbook BTCV, ISBN 094675229X

Agate E. 2001. Tree Planting and Aftercare: A Practical Handbook BTCV, ISBN 0946752257 Agate E. 2002. Woodlands: A Practical Handbook BTCV, ISBN 0946752338

Coombes A 2000. Trees Dorling Kindersley, ISBN 0751327468

Evans J. 1984. Silviculture of Broadleaved Woodlands. The Stationary Office Books. ISBN 0117101548 Hart C. 1995. Alternative Silvicultural Systems to Clear Cutting in Britain: A Review. The Stationary Office Books. ISBN 0117103344

Hibberd B. 1991. Forestry Practice The Stationery Office Books, ISBN 0117102814

Johnson O and More D. 2006. Collins Tree Guide Harper Collins, ISBN 0007207719

Kerr G. 1993. Growing Broadleaves for Timber Forestry Commission, ISBN 0117103144 Mason WL. 1999. Cultivation of Soils for Forestry. Forestry Commission. ISBN 085538400X

Matthews JD. 1991. Silvicultural Systems. Oxford University Press. ISBN 0198546702 Mason WL. 1999. Cultivation of Soils for Forestry. Forestry Commission. ISBN 0855384005

May A and Panter J. 2000. Guide to the ID of Broad-leaved Trees and Shrubs in Winter. Field Studies Council.

Mitchell A. 1992. Collins Field Guide: Trees of Britain and Northern Europe. Harper Collins. ISBN 0002192136

Morgan JL. 1999. Forest Tree Seedlings. Forestry Commission. ISBN 0855384042

Pepper HW. 1992. Forest Fencing. Forestry Commission. ISBN 0855386886

Pepper HW. 1998. The Prevention of Rabbit Damage to Trees in Woodland. Forestry Commission. ISBN 0855383720

Pepper HW. 1999. Recommendations for Fallow, Roe and Muntjac Deer Fencing: New Proposals for Temporary and Reusable Fencing. Forestry Commission. ISBN 0855385057

Potter MJ. 1991. Treeshelters. Forestry Commission. ISBN 0117102881

Savill P. 1991. The Silviculture of Trees used in British Forestry. CABI Publishing. ISBN 0851987392

Savill P, Evans J, Auclair D and Falck J. 1997. Plantation Silviculture in Europe. Oxford University Press. ISBN 0198549086

Trout RC. 1992. Forest Fencing. Forestry Commission. ISBN 0117103047

Journals and magazines

- Quarterly Journal of Forestry (RFS)
- Forestry & Timber News (Confor)
- Forestry (ICF)
- Forestry Journal
- Essential Arb
- Timber Harvesting

Websites

Confederation of Forest industries	www.confor.org.uk
Forestry Industry Safety Accord	www.ukfisa.com
Royal Forestry Society	www.RFS.org.uk
Forestry Commission	www.forestry.gov.uk
Health and Safety Executive	www.HSE.gov.uk
Royal Horticultural Society	www.rhs.co.uk
Tree Council	www.treecouncil.org.uk
Continuous Cover Forestry Group	www.ccfg.org.uk

Plant trees: books & guidance:

- Collins Complete British Trees
- BTCV Tree Planting and Aftercare
- ISA Tree Selection and Planting
- Forestry commission 1991. Tree shelter
- Forest tree seedlings – best practice in supply, treatment, and planting

Plant trees - websites:

Royal Forestry Society	www.RFS.org.uk
Forestry Commission	www.forestry.gov.uk
Health and Safety Executive	www.HSE.gov.uk
Royal Horticultural Society	www.rhs.co.uk
Tree Council	www.treecouncil.org.uk

Duty 5: Clear vegetation

What is this duty about?

Clearing unwanted vegetation using appropriate methods. It is likely that work will be to a given specification that may define methods to be used but apprentices will be expected to determine how to carry out these methods on site.

The following kinds of unwanted vegetation should be covered: woody, herbaceous, grass, competing, hazardous, notifiable, and excessive.

Control methods may be manual, motor-manual, or chemical. 'Mechanised' equipment can include brushwood cutter, chainsaw, clearing saw, strimmer etc.

If working with chemicals or machinery, appropriate training or certification should be held in line with current legislation and good practice guidance.

Learning outcomes

Learners will be able to

5.1 Carry out methods of control on unwanted vegetation and post planting protection

Learning outcome 5.1: Carry out methods of control on unwanted vegetation and post planting protection

Topics

5.1.1 Control unwanted vegetation

Topic 5.1.1 Control unwanted vegetation

How to identify unwanted vegetation:

- Post – planting monitoring requirements, including beat-up assessments
- Types of operation – weeding, cleaning, respacing
- Species identification
- Legal requirements – noxious weeds / invasive plants/ Wildlife & Countryside Act 1981

Selecting and implementing appropriate working method in accordance with the assessed risks:

- Choice of machinery and equipment
- Safe working distances
- PPE
- Control methods
- Manual
- Motor-manual
- Chemical

How to select appropriate method and equipment for vegetation control:

- Woody growth
- Herbaceous weeds
- Grass
- Competing / excessive vegetation
- Hazardous weeds
- Notifiable weeds

Controlling unwanted vegetation in line with best practice and/or specification:

- Hand weeding
- Mechanical weeding
- Chemical weeding
- Mulching or mulch mats

Legal requirements and good practice guidelines to minimise environmental damage:

- Pollution
- Damage to habitats
- UK Forestry Standard requirements
- Code of Practice for using Plant Protection Products requirements
- Maintaining records as appropriate

Removal and disposal of all waste and surplus materials as specified and in line with legislation.

- Disposal of organic / inorganic / hazardous waste

The potential impacts of the work on the environment and how these can be minimised:

- Minimising and avoiding damage to surrounding trees, other plants, animals, and structures such as fences, paths and signs
- The types of damage acceptable under various circumstances.
- Restoring the site to a clean and tidy condition

The basic implications of:

- Terrain
- Ground conditions
- Vegetation
- Season
- Weather

Relevant legislation:

- Control of Pesticides Regulations 1986
- Food and Environment Protection Act 1985
- Control of Substances Hazardous to Health Regulations 2002
- UK Forestry Standard (UKFS)

Suggested learning resources

Books

- Willoughby, I 1996. Forestry Commission Research Information Note 274 'Noxious Weeds' ISSN 0267 2375
- Willoughby, I & Dewar, J 1995. The Use of Herbicides in the Forest ISBN: 9780117103306
- Forestry Commission, 2024 The UK Forestry Standard, ISBN 978-1-83915-021-0

Journals and magazines

- Quarterly Journal of Forestry
- Forestry and British Timber

Websites

Royal Forestry Society	www.RFS.org.uk
Forestry Commission	www.forestry.gov.uk
Health and Safety Executive	www.hse.gov.uk
Forest Industry Safety Accord	www.ukfisa.com

Duty 6: Measure and select trees for removal

What is this duty about?

Mensuration is the determination of dimensions, form, age and increment of single trees, stands or whole woods. These may be standing or after felling. The core knowledge gives an understanding of basic mensuration.

Learning outcomes

6.1 Understand basic mensuration

Learning outcome: 6.1: Understand basic mensuration

Topics:

6.1.1 Basic mensuration techniques and terminology

Topic 6.1.1 Basic mensuration techniques and terminology

- Diameter at Breast height (DBH)- Forked trees, Leaning trees, Trees on Slopes, Deformed trees, Coppice
- Length
- Height - Top Height, Form Height, Timber Height
- Volume - Cubic metres (m3)
- Area - Square metres (m2), Hectares (Ha), Acres
- Importance of accuracy

Units for measurement:

- DBH - centimetres
- Length - metres
- Height - metres
- Mid diameter - centimetres
- Volume - cubic metres

Tools for measurement and their purpose:

- Girth Tape
- Callipers
- Measuring Tapes
- Clinometers

Checking the accuracy of girth tapes:

- Check for Stretching
- Compare against steel rule e.g., Loggers tape
- How is tape stored

Measuring diameter at breast height (DBH):

- Measure at 1.3m.
- Only if over 7cm
- Use appropriate methods for – sloping ground, uneven or ploughed ground, where swelling occurs at 1.3m., leaning trees, coppice stems, forked trees

Measuring stacked timber:

- Estimating stacked timber volume
- Stack shape
- Stack size
- Measurement using appropriate method - length, height, width.
- Stack conventions - stack construction, stack variation, conversion factors

Suggested learning resources

Books

- Avery T. and Burkhart H. 2001. Forest Measurements. McGraw-Hill Publishing. ISBN 0071130055
- Burrough PA and McDonnell RA. 1998. Principles of Geographic Information Systems. Oxford University Press. ISBN 0198233655
- Husch B, Beers TW, and Kershaw JA. 2003. Forest Mensuration. Wiley Blackwell. ISBN
- Mackie ED and Matthews RW. 2006. Forest Mensuration: A Handbook for Practitioners. Forestry Commission. ISBN 0855386215
- Mackie ED and Matthews RW. 2008. Timber Measurement. Forestry Commission. ISBN 97800855387495 Philip M. 1994. Measuring Trees and Forests. CABI Publishing. ISBN 0851988830
- Shiver BD and Borders BE. 1996. Sampling techniques for Forest Resource Inventory. John Wiley and Sons. ISBN 0471109401
- West P. 2003. Tree and Forest measurement. Springer Verlang. ISBN 3540403906

Journals and magazines

- Quarterly Journal of Forestry (RFS)
- Forestry & Timber News (Confor)
- Forestry (ICF)
- Forestry Journal
- Essential Arb
- Timber Harvesting

Websites

Royal Forestry Society	www.rfs.org.uk
ConFor	www.confor.org.uk
Forestry Commission	www.forestry.gov.uk
FISA	www.ukfisa.com
Forest Research	www.forestry.gov.uk

Duty 7: Fell small trees

What is this duty about?

This duty covers the basic knowledge, understanding and skills required to fell small trees (Up to 380mm) using a chainsaw. It will also look at the ergonomic systems an operator can use during felling operations.

The apprentice should be able to describe the felling process including preparation, ergonomic felling systems, a range of felling cuts and when they are used, and processing of the tree into products prior to extraction.

Learning outcomes:

Learners will be able to:

7.1 Fell small trees up to 380mm

7.2 Fell small trees up to 200mm

Learning outcome 7.1: Fell small trees up 380mm

In this outcome learners know how to and be able to fell small trees with a diameter up to 380mm. They will also crosscut the timber and dispose of the waste. Pre- start checks, safe starting techniques and safe cutting methods will be central to this outcome.

Topics

7.1.1 Assess risks prior to felling and cross cutting operation
7.1.2 Felling equipment
7.1.3 Methods for felling and cross cutting selected small diameter trees
7.1.4 Techniques to deal with a tree that has sat back against the intended felling direction
7.1.5 Use of organised felling systems

Topic 7.1.1 Assess risks prior to felling and cross cutting operation

Learners will know and able to assess risks prior to felling and cross cutting operation:

- ground conditions / undergrowth
- escape routes
- weather conditions
- above and below ground utilities
- loose or dangerous limbs overhead
- local dangerous trees including leaning, windblown, dead and rotten trees
- foreign objects in tree at cutting level such as wires or fencing

The learners will understand assessment of different problem trees and the methods to fell them safely:

- leaning trees
- hung-up trees
- co-dominant stumps
- trees with damage
- trees with rot
- dead trees
- trees in difficult locations,
- trees close to other objects such as overhead powerlines.

Topic 7.1.2 Felling equipment

Learners will know and be able to use a range of equipment to assist them in felling trees:

- Wedges
- Felling levers
- Turning strap

Topic 7.1.3 Methods for felling and cross cutting selected small diameter trees

Learners will safely fell and crosscut trees whilst considering the following:

- Pre felling:
    - risk assessment carried out
    - escape routes established
    - felling only if safe to do so
    - direction of fell
    - Tree brashed according to best industry practice

- Felling:
    - correct use of chainsaw/felling aids
    - correct felling cut selected- conventional, dogs' tooth, split level or Danish cut (safe corner cut)
    - Hinge of correct size

- Branch removal:
    - Tree branches removed using a recognised method of snedding or delimbing.

- Crosscut:
    - meeting given specifications
    - avoiding hitting ground with bar and chain
    - awareness of tension and compression
    - work technique
    - avoid 'pinching' the bar

Topic 7.1.4 Techniques to deal with a tree that has sat back against the intended felling direction

Learners will know techniques to deal with a tree that has sat back against the intended felling direction:

- Make a small bore cut into back of the tree so a wedge of felling lever can be used to tip the tree over.
- Make felling cuts to fell the tree in the direction of the lean if site conditions allow

Topic 7.1.5 Use of organised felling systems

Advantages of setting up organised felling systems:

- Provide and ergonomic working height for processing felled trees
- Easier to turn the trees during processing
- Reduce the need for manual handling
- Clear timber and brash zones enable easier and more efficient extraction of timber

Learning outcome 7.2 Fell small trees up 200mm

Topics

7.2.1 The learner will know and be able to use a range of felling techniques to fell trees up to 200mm

Topic 7.2.1 the learner will know and be able to use a range of felling techniques to fell trees up to 200mm

Know and be able to use

- Conventional felling cut
- Step cut- trees that are upright or slightly leaning in the direction of fall
- 80% cut
- Spear cut
- Double v-cut- trees leaning heavily in the direction of fall

Suggested learning resources

Books

- Forest Industry Safety Accord (FISA) Safety Guides
- Arboriculture and Forestry Advisory Group (AFAG) Safety Guides
- Hibberd B. 1991. Forestry Practice. The Stationery Office Books. ISBN 0117102811
- Ireland, D. 2004. Winching Operations in Forestry: Tree Takedown and Vehicle Debogging. Norwich: Stationary Office Books. ISBN 085538638X.
- Kestel, B. 2009. Chainsaw Operator's Manual: The Safe Use of Chainsaws. Australia: Landlinks Press. ISBN 0643090282.
- Jepson J. 2011. To Fell a Tree- A complete guide to successful tree felling
- Working with a Chainsaw Part 1 Husqvarna
- Working with a Chainsaw Part 2 Husqvarna
- INDG317 Chainsaws at Work HSE ISBN: 0 7176 6187 3
- Organized Felling- Rules and methods for organizing the work of final felling- Husqvarna forestry technique.

Journals and magazines

- Forestry and British Timber
- Forestry Journal

Websites

Health and Safety Executive (HSE)	www.hse.gov.uk
Forest Industry Safety Accord	www.ukfisa.com
Royal Forestry Society	www.RFS.org.uk
Forestry Commission	www.forestry.gov.uk
NPTC	www.nptc.org.uk
Lantra	www.lantra-awards.co.uk

Duty 8: Maintain Forest infrastructure

What is this duty about?

This duty describes the estate management skills a forester needs and does **not** include construction of forest roads, though it **does** include an understanding of the types / general layout of forest roads and rides and their maintenance requirements.

Learning outcomes

In this unit, learners will be able to

8.1 Carry out maintenance and repair of open drainage systems, fencing and boundary features, and infrastructure.

Learning outcome 8.1 Carry out maintenance and repair of open drainage systems, fencing and boundary features, and infrastructure

Topics:

8.1.1 Maintenance and repair of forest infrastructure

Topic 8.1.1 Maintenance and repair of forest infrastructure

Defective infrastructure:

- Roads, tracks, rides
- Drains, ditches, culverts
- Boundary features – fences, walls, banks
- Infrastructure e.g. gaps, gates, stiles, boardwalks, way markers, tree shelters

Procedures to maintain and repair defective structures:

- Routine maintenance tasks e.g. clearing ditches, restoring banks, checking and adjusting wire tension, improving access infrastructure
- Reporting the presence of a defect in the structure to the appropriate person
- Risk assessments – site and operational hazards i.e. overhead / underground services, machinery / equipment hazards, biological hazards e.g. Weil's disease
- If appropriate effect immediate repairs in line with manufacturer's instructions, operator capability and management objectives
- Follow instructions regarding any further actions to be taken.

Which repairs are appropriate to be undertaken and those that should be reported in accordance with manufacturer's instructions and industry good practice guidance:

- Reporting procedures
- Instructions / Specifications / design e.g. stiles, boardwalks
- Construction (Design & Management) Regulations 2015
- FISA guides – e.g. Using Equipment Safely / Fencing

Suggested learning resources

Books

- Agate, E. 2001 Fencing: A Practical Handbook. Doncaster, BTCV. ISBN 094675229X
- Agate, E, Brooks, A, Adcock, S. 1999 Dry Stone Walling: A Practical Handbook. Doncaster, BTCV, ISBN 094675219

Journals and magazines

- Fencing & Landscaping News

Websites

Forest Industry Safety Accord	www.ukfisa.com
Health and Safety Executive	www.hse.gov.uk
Lantra Sector Skills Council	www.lantra.co.uk
The Conservation Volunteers	www.tcv.org.uk

Duty 9: Operate and maintain forestry tools, equipment and machinery

What is this duty about?

This covers the routine maintenance of equipment, machines and hand tools and is core for all apprentices. Such maintenance is usually recommended by manufacturers to maximise the working life of the equipment or machinery.

Routine maintenance of equipment is vital to ensure that the tools being used operate as safely and accurately as possible. Proper maintenance carried out over the life of a machine will extend its lifespan and ensure that the operator is not exposed to greater risk, by component failure or increased vibration or physical effort. It also ensures that the machine conforms to current legislation, and manufacturers recommendations.

If working with chemicals or machinery, appropriate training or certification should be held in line with current legislation and good practice guidance.

Learners should be able to carry out basic routine maintenance on a range of commonly used forestry tools. All work should be compliant with recent legislation, and follow manufacturer's guidelines, and the Learner should have a working knowledge of what that legislation and guidance is, and what it means.

The learner should be able to set up, carry out and complete the operation in a safe and organised way, without putting themselves or others at risk, and without causing damage to the machine or the environment.

Learning outcomes

9.1 The learner will be able to operate and maintain forestry tools, equipment and machinery.

Learning outcome 9.1 The learner will be able to operate and maintain forestry tools, equipment and machinery

Topics

9.1.1 Prepare equipment tools and machinery for maintenance
9.1.2 Ensure the equipment and machines requiring maintenance are safe and completely isolated from the power source.
9.1.3 Take the correct precautions to minimise dangers and deal with waste safely and correctly in accordance with legislation
9.1.4 Ensure that the work area is safe and, in a condition, suitable for the maintenance procedure
9.1.5 Maintain equipment and machines in accordance with manufacturer's instructions standard procedures, legislation, policies and procedures
9.1.6 Identify the need for advice and assistance and refer to the appropriate person
9.1.7 Ensure repaired equipment and tools are in safe working order
9.1.8 Clean, service and store maintenance tools safely and effectively

Topics 9.1.1: Prepare equipment tools and machinery for maintenance

The learner should be able to interpret the machine manual, and from the information supplied by the manufacturer, be able to select the appropriate tools for the job they are going to carry out. This could include the correct files for a chainsaw, for instance, or the correct sized spanners to remove bolts.

The equipment should be prepared in such a way that it can be worked on in a safe, ergonomic and controlled environment where any potential issues can be dealt with easily.

Topic 9.1.2. Ensure the equipment and machines requiring maintenance are safe and completely isolated from the power source.

The machine should be isolated according to manufacturer's recommendations. This may involve key removal, lock –out/ tag- out systems, battery removal, PTO disconnection, or disengaging isolation switches.

The learner should be able to explain why a machine may need to be left for a while before maintenance takes place. This could be because the machine is hot, or because there is still pressure in fluid systems such as radiators or hydraulic hoses. The learner should be able to describe how the stored energy in systems can cause harm.

Topic 9.1.3 Take the correct precautions to minimise dangers and deal with waste safely and correctly in accordance with legislation

The learner should be able to correctly identify the specific hazards associated with the operation, for instance petrol, hydraulic oil, or diesel.

The learner will select appropriate control measures to mitigate identified hazards and ensure that they have the correct equipment and PPE on site to be able to keep themselves safe. COSSH Data sheets should be present for chemicals, to allow the learner to have the correct information.

The learner should have emergency equipment to hand such as an appropriate spill kit, and the ability to dispose of spills should anything occur.

Learners will explain disposal and reporting procedures. They should understand the legislation that applies to chemical spills and accidents. Specific reference should be made to COSHH and RIDDOR. The reporting procedure should be explained, and the learner should be able to safely deal with a spill and be able to accurately document what happened and what steps they took to remedy the situation. They should also be able to explain who they should report to in the workplace.

Topic 9.1.4: Ensure that the work area is safe and, in a condition, suitable for the maintenance procedure

The learner should undertake a detailed risk assessment of the work area. This should include potential sources of ignition and contamination, and they should be able to enforce a safe working area around them.

The learner should be able to explain what signage may be required, particularly in public areas, and what PPE they will need in that area.

Topic 9.1.5 Maintain equipment and machines in accordance with manufacturer's instructions standard procedures and legislation.

The learner will state what tools and equipment they require for the task and will have collected and arranged it in a professional manner. They should be able to refer to the manual to ascertain if there is any specific equipment they will need, and for any information such as torque settings that might be required to inform their decision.

The learner will be able to demonstrate safe use of the tools and equipment at all times and will also ensure the safety of others around them. They will wear appropriate PPE for the task throughout.

The learner will be able to demonstrate knowledge of the procedures and legislation that underpins the operation they are carrying out. They should be able to interpret the relevant parts of The Health and Safety at Work Act (HASAWA) (1974), The Management of Health and Safety at Work Regulations (1999) and The Provision and Use of Work Equipment Regulations (PUWER) (1998), to inform them of the correct procedures to follow for this operation.

The Learner should be able to explain what guidance is available to them such as FISA guides, manufacturers manuals.

Topic 9.1.6 Identify the need for advice and assistance and refer to the appropriate person

The Learner will identify situations in which assistance may be required to include:

- Beyond own capabilities
- Not having the correct tool for the job
- Requiring spare parts

Learner will identify implications of not asking for assistance if required to include:

- Injury to person carrying out maintenance or others
- Making the machine inoperable
- Increased down time
- Increased cost of repair

Topic 9.1.7 Ensure repaired equipment and tools are in safe working order.

The Learner should be able to check the tools or equipment after maintenance. This will include post maintenance checks such as starting a machine and ensuring it now performs within manufacturer's norms.

Topic 9.7.8 Clean, service and store maintenance tools safely and effectively

Clean or disposal of tools and disposal of residues. The Learner will be able to demonstrate the correct method of dealing with the tools used during maintenance. For example, if a file is now inoperable, it will be recycled rather than being put back in the toolbox. Any metal filings and contamination will be removed before replacement in the toolbox.

The learner will be able to explain the process when tools are damaged or defective. They should be repaired or removed from service.

The Learner will explain or demonstrate correct storing of tools, for example returning the equipment to the correct places.

The learner will keep all records required.

Suggested learning resources

Publications

- Working with a Chainsaw Part 1 Husqvarna
- Working with a Chainsaw Part 2 Husqvarna
- INDG317 Chainsaws at Work HSE ISBN: 0 7176 6187 3

Websites:

- Arboricultural Association www.trees.org.uk
- Forestry Commission www.forestry.gov.uk
- FISA www.ukfisa.com
- Health and Safety Executive www.hse.gov.uk
- NPTC www.nptc.org.uk

Duty 10: Monitor and control pest, diseases, and disorders

What is this duty about?

Management of threats (including invasive species), pests, diseases and disorders are becoming increasingly crucial to UK Forestry. Forest Craftsperson apprentices have an important role; potentially identifying a new problem early so that it can be managed. This duty covers identifying pests, diseases, disorders, and invasive species affecting trees, woodlands, and forests.

Learners should know how to identify and recognise the impact of threats, pests (including insects and mammals) and diseases encountered in UK forestry, particularly those affecting commercially important timber species.

The aim is to provide the learner with the knowledge, understanding and skills required to communicate information within the workplace.

Learning outcomes

Learners will be able to

10.1 Understand threats, pests, diseases, and disorders.

Learning outcome 10.1 Understand threats, pests, diseases and disorders

Topics:

10.1.1 Plant health legislation, policies, and procedures
10.1.2 Monitoring trees
10.1.3 Identifying pests, diseases, and disorders
10.1.4 Reporting and recording (pests diseases and disorders)
10.1.5 Controlling pests, diseases and disorders
10.1.6 Principles of Integrated Pest Management (IPM)

Topic 10.1.1 Plant health legislation, policies and procedures

Be able to carry out all work in accordance with relevant environmental, plant health and health and safety legislation, risk assessment requirements, codes of practice and company policies including biosecurity measures.

- Wildlife and Countryside Act 1981 (as amended)
- Pests Act 1954 (as amended)
- Plant Health Act 1967 (as amended)

Know and understand:

- Workplace policies and procedures relating to the identification and reporting of threats, pests, diseases and disorders
- Workers responsibilities under environmental, plant health and conservation legislation including biosecurity measures.

Topic 10.1.2. Monitoring trees

Be able to monitor the trees according to specifications

Know and understand:

- Reasons for monitoring trees
- When to carry out monitoring (i.e. frequency and regularity)

Topic 10.1.3 Identifying pests, diseases and disorders

Be able to:

- Correctly identify the presence of common threats, pests, diseases, and disorders
    - Mammals such as: deer, rabbit, voles, squirrel, wild boar
    - Insects such as: large pine weevil, great spruce bark beetle, Asian longhorn beetle, oak processionary moth, etc.
    - Diseases such as: *Phytopthora ramorum*, ash dieback, red band needle blight, acute oak decline, sweet chestnut blight, conifer root and butt rot, etc.
    - Fungal colonisations such as: *Heterobasidion annnosum*, honey fungus (*Armillaria mellea*), giant polypore (*Meripilus giganteus*), cauliflower fungus (*Sparassis crispa*), etc.
    - Invasive plant species such as: Japanese knotweed, Himalayan balsam, ragwort, other
    - Disorders for example nutrient deficiency
- Establish the extent of the pest population, disease and any disorders
- Carry out work in a manner which prevents damage to the surrounding area

Know and understand:

- Common types of threats, pests, diseases, and disorders
- The potential effects and threat of climate change on forestry
- The problems caused by common threats, pests, diseases and disorders to trees
- How pests and diseases can be introduced to a site

Topic 10.1.4 Reporting and recording (pests diseases and disorders)

Be able to:

- Promptly report the presence and extent of threats, pests, diseases, and disorders to the appropriate person
- Complete records as appropriate

Know and understand:

- To whom the presence and extent of threats, pests, diseases, disorders and biological control/ beneficial insects should be reported
- The potential impact of the work on the environment and how to minimise this

10.1.5 Controlling, pests diseases and disorders

- Types of control measures including cultural, biological and chemical for pests and diseases and how they are used for different pests and diseases (including damage from mammals)
- Relevant biological control and beneficial insects as they apply to trees within the relevant area of responsibility
- How biosecurity measures prevent introduction and spread of pests and diseases
- The importance of following training, guidance and instructions when applying chemicals for health and safety, minimising of environmental harm, achieving required control levels and managing pesticide resistance

Topic 10.1.6 Principles of Integrated Pest Management (IPM)

Understand the aims of IPM:

- support healthy crops using a range of plant protection methods
- support resilient and sustainable production
- help manage pesticide resistance
- encourage natural control mechanisms
- enhance wildlife and biodiversity
- reduce reliance on the use of chemical pesticides, also known as plant protection products (PPPs)

Understand the key elements of IPM

- Prevention of pests, weeds and diseases establishing for example through species selection and mixture, supporting natural predators, hygiene.
- Monitoring; animals and plants classified as pests or weeds may be important to the structure and function of local ecosystems. Effective monitoring ensures you only use chemical pesticides when necessary. You should choose the correct control method for your land and apply it at the right time. This might be through inspection, pest, weed and disease identification and getting professional advice.
- Use of thresholds to consider pest, weed and disease pressures, region, crops and particular climatic conditions to help you decide when to use control measures. Once a threshold, or predicted threshold, has been exceeded (such as when pest population levels, pest damage or weed prevalence become economically or environmentally unsustainable) you should take action to control the pest.
- Using a full range of control measures including cultural (e.g. mulching) and biological (e.g. predatory species or pheromones to disrupt insect mating). Chemical control is used only to the minimum effective does and application frequency. Targeted to prevent negative impacts.
- Managing pesticide resistance to maintain effectiveness of chemical pesticides.
- Review and evaluate the effectiveness of all plant protection and control measures. This can be done by having an IPM Plan that is reviewed annually.

Suggested learning resources

Books/Publications:

Bevan D. 1987. *Forest Insects.* The Stationery Office Books. ISBN 0117102008

Butin H, Lonsdale D and Strouts RG. 1995. *Tree Diseases and Disorders: Causes, Biology and Control in Forest and Amenity Trees*. Oxford University Press. ISBN 0198549326

Fay N, Dowson D and Helliwell R. 2005. *Tree Surveys: A Guide to Good Practice.* Arboricultural Association. ISBN 0900978388

Gregory S and Redfern D. 1998. Diseases and Disorders of Forest Trees: A Guide to Identifying Causes of Ill-health in Woods and Plantations. The Stationery Office Books. ISBN 0117103381

Lonsdale D. 1999. Principles of Tree Hazard Assessment and Management. The Stationery Office Books. ISBN 0117533556

Mattheck C. 2007. *Field Guide for Visual Tree Assessment*. Karlsruhe Research Centre. ISBN 9783923704590

Peace T. 2001. *Pathology of Tree and Shrubs*. Trollius Publications. ISBN 0953971813

Phillips DH and Burdekin DA. 1992. *Diseases of Forest and Ornamental Trees*. The Macmillan Press Ltd. ISBN 0333494938

Prior R. 1994. Trees and Deer: How to Cope with Deer in Forest, Field and Garden. Swan Hill Press. ISBN 1853104329

Schwarze F, Engels J, Mattheck C and Linnard W. 2000. *Fungal Strategies of Wood Decay in Trees*. Springer-Verlag. ISBN 3540672052

Schwarze F. 2008. Diagnosis and Prognosis of the Development of Wood Decay in Urban Trees. ENSPEC.

Strouts B and Winter T. 2000. *Diagnosis of Ill-Health in Trees, 2nd Edition*. The Stationery Office Books. ISBN 0117535451

Watson G. 2013. *Tree Pests and Diseases: An Arborists Field Guide*. Arboricultural Association. ISBN 9780900978-56-2

Watson G. and Green T. 2011. *Fungi on Trees; An Arborists Field Guide*. Arboricultural Association. ISBN 978-0-900978-55-5

Weber K and Mattheck C. 2003. *Manual of Wood Decays in Trees*. Arboricultural Association. ISBN 090097835X

websites:

- Forestry Commission – Keep it clean web pages www.forestry.gov.uk/england-keepitclean
- Forestry Commission – Pests and diseases www.forestry.gov.uk/pestsanddiseases
- The Arboricultural Association – Pests and diseases www.trees.org.uk/Help-Advice/Pests-and-Diseases
- Forest Research – Pest and disease resources www.forestresearch.gov.uk
- Integrated Pest Management in Farming Integrated Pest Management (IPM) in farming - GOV.UK

Duty 11: Maintain records including digital records

What is this duty about?

This duty covers the recording of information in the forestry industry how it can be recorded, by who and the reason for gathering the data.

It is also important for the learner to understand the importance of recording the information correctly and the consequences of not doing so.

Learning outcomes

11.1 Maintain records

Learning outcome 11.1 Maintain records

Topics:

11.1.1 Maintain records including digital records and reports

Topic 11.1.1

Maintain records including digital records and reports:

- Completion of Job sheets for a range of forest operation
- Completion of maintenance records for machinery e.g., chainsaws
- Producing risk assessments and emergency procedures
- Completion of accident and incident reports
- Completion of reports on pest and diseases or dangerous trees found during surveys or whilst carrying out other work
- Ensuring the information recorded is correct, relevant, and accurate
- Know who to communicate the information to
- Making sure this information has been received and understood

Suggested learning resources

Books

Forestry Commission -Managing public safety on harvesting sites
Hibberd B. 1991. Forestry Practice-The Stationery Office Books, ISBN 0117102814
Agate E. 2002. Woodlands: A Practical Handbook BTCV

Websites

Confederation of Forest industries	www.confor.org.uk
Forestry Industry Safety Accord	www.ukfisa.com
Royal Forestry Society	www.RFS.org.uk
Forestry Commission	www.forestry.gov.uk
Health and Safety Executive	www.HSE.gov.uk
Forest Research	www.forestresearch.gov.uk

Duty 12: Communicate with supervisors, colleagues, public and others

What is this duty about?

Communication within modern forestry is vital to ensure the health and safety of everyone working in the industry and those using the forest for other activities.

Forest craftsperson's must work as part of a team and represent their organisation professionally. This unit will enable them to understand their role in ensuring health and safety and ensuring that the information is interpreted correctly to complete a job to the correct standard.

Learning outcomes

12.1 Communicate with supervisors, colleagues, public and others

Learning outcome 12.1 Communicate with supervisors, colleagues, public and others

Topics

12.1.1 Communicate with supervisors, colleagues, public and others
12.1.2 Key roles when delivering Forestry works and their responsibilities
12.1.3 The importance of effective interpersonal skills in the workplace
12.1.4 Recording a portfolio of experience

Topic 21.1.1 Communicate with supervisors, colleagues, public and others

Know methods for communicating with technical and non-technical audiences.

Be able to communicate with supervisors, colleagues, public and others to achieve objectives. Understand how good communication can have a positive effect on safety and performance.

Be able to communicate in ways that help people to understand the information / knowledge being communicated to them and its relevance including adapting communication for the audience:

- Signage
- Information boards
- Websites
- Verbal communication on site.

Process information and communicate using digital technology for example emails, word processing software, video meeting software or other applications for recording and sharing information.

Topic 21.1.2 Key roles when delivering Forestry works and their responsibilities

FISA's guidance on 'Managing Health and Safety in Forestry' defines key roles in forestry in the planning and delivery of forestry work who is responsible for what and how that is communicated. The forest worker has a part to play in this.

- The key elements in the timber supply chain such as timber markets and processing
- Main roles in the supply chain and associated duties:
    - Definition of main roles i.e., Landowner, Forestry Work Manager (FWM), Contractor, Sub-contractor, Forestry Worker.
    - Examples of who may take on each role
- Roles and responsibilities of those assisting Duty Holders:
    - Contractor's Site Safety Coordinator(s)
    - Forestry Works Supervisor (FWS)

Key tasks of each role

- Landowner:
    - Co-ordination of the activities of the overall forest environment for health and safety purposes
    - Gathering information about hazards on and around forestry worksites and communication these to the FWM
    - Ensuring that the work on a particular site does not affect the health and safety of other people
- Forestry Work Manager (FWM):
    - Using information from the Landowner to prepare an outline risk assessment for work on the site and for haulage of timber away from site
    - Selecting competent Contractors who have made adequate provision for health and safety
    - Specifying health and safety measures for Contractors working on the site and anyone else who may be affected by the work activity
    - Liaising with the Landowner
    - Monitoring health and safety on site
- Contractor:
    - Work with the FWM and FWS to ensure health and safety standards are met
    - Select sub-contractors who are skilled and experienced, competent and have made adequate provision for health and safety
    - Manage employees and sub-contractors and ensure they work safely
    - Ensuring the appropriate arrangements are in place so that safe systems of work are maintained if the owner / controller of the Contractor's business is absent
- Sub-contractor:
    - Co-operation with the arrangements for health and safety on site
    - Managing personal health and safety
      Reporting any unsafe practices of occurrences

- Contractor's Site Safety Coordinator(s)
    - Helping to maintain compliance with site safety rules
    - Coordinating with the Contractor or FWM regarding any safety issues
    - Acting as contact point for third parties coming onto site
- Forestry Worker
    - Take care of their own health and safety and that of people who may be affected what they do or do not do
    - Co-operate with others on health and safety and do not interfere with or misuse, anything provided for their health, safety, and welfare
    - Follow the training they have received when using equipment provided
    - Report injuries, unsafe practices or occurrences to the contractor or employer

Topic 12.1.3 The importance of effective interpersonal skills in the workplace

Learners will understand the importance of effective interpersonal skills in the workplace when dealing with customers and colleagues, to include:

- Effective communication (e.g. addressing others face to face, appropriate telephone manner, effective written communication, use of social media)
- Being respectful of others
- Courtesy and helpfulness
- Appropriate dress and body language
- Product knowledge
- Use of technical terms

Learners will understand how good communication can contribute to establishing a good health and safety culture within their workplace, for example:

- Prompt reporting of defective safety equipment or other matters of concern
- Help others to work safely by sharing knowledge and good practice

Topic 12.1.4 Recording a portfolio of experience

Items that can be included in a portfolio of experience for example training and qualification certificates, photographs, testimonials, examples of work.

Methods for storing a portfolio including paper folder or electronic records.

Value of keeping a portfolio

- Demonstrating competence when applying for new jobs, asking for increased responsibility or tendering for work
- Meeting compliance requirements for contracts or site access
- Working towards professional membership
- Setting goals and managing career objectives

Suggested learning resources

Books

- Forestry Commission -Managing public safety on harvesting sites
- Hibberd B. 1991. Forestry Practice-The Stationery Office Books, ISBN 0117102814
- Agate E. 2002. Woodlands: A Practical Handbook BTCV

Websites

- Confederation of Forest industries www.confor.org.uk
- Forestry Industry Safety Accord www.ukfisa.com
- Royal Forestry Society www.RFS.org.uk
- Forestry Commission www.forestry.gov.uk
- Health and Safety Executive www.HSE.gov.uk

Duty 13: Use geographical tools including Global Positioning Systems (GPS), maps and plans

What is this duty about?

This duty looks at how a range of geographical tools can be used as part of forest operations from planning right through planting to harvesting of timber.

Learning outcome:

13.1 Use geographical tools

Learning outcome 13.1 Use geographical tools

Topics:

13.1.1 Use geographical tools including Global Positioning Systems (GPS), maps and plans

Topic 13.1.1 Use geographical tools including Global Positioning Systems (GPS), maps and plans

- Be able to read a map and interpret features to locate sites
- Produce a three-figure grid reference for others to locate sites or use grid references to form part of an emergency plan.
- Understand map scales and how to use them
- Interpret constraints maps and plans
- Use a GPS system for site location, plotting trees that require work for example
- Understand how good surveys and maps of the forest, is the first step in making good, informed decisions about future forest management
- Digital maps can be used during harvesting operations showing progress timber locations on site.
- Use of GPS, maps in recording location of important wildlife habitats, historical and archaeological sites.

Suggested learning resources

Books

- Peter Hawkins- Map and Compass the art of navigation- Cicerone

Websites

- Ordnance Survey www.ordnancesurvey.co.uk
- Forestry Journal https://www.forestryjournal.co.uk/news/23271516.gps-trialled-bid-improve-scotlands-timber/

Forest establishment and maintenance craftsperson option

Duty 14: Manage vegetation (establishment & maintenance)

What is this duty about?

This is about controlling unwanted vegetation using appropriate methods. It is likely that work will be to a given specification that may define methods to be used but apprentices will be expected to determine how to carry out these methods on site.

The following kinds of unwanted vegetation should be covered: woody, herbaceous, grass, competing, hazardous, notifiable, and excessive.

Control methods may be manual, motor-manual, or chemical. 'Mechanised' equipment can include brushwood cutter, chainsaw, clearing saw, strimmer etc.

If working with chemicals or machinery, appropriate training or certification should be held in line with current legislation and good practice guidance.

Maintenance of rides and glades for access and habitat management will also be covered.

Learning outcomes

In this unit, learners will be able to

14.1 Carry out methods of control on unwanted vegetation and post planting protection
14.2 Management of vegetation in the forest stand

Learning outcome 14.1 Carry out methods of control on unwanted vegetation and post planting protection

Topics:

14.1.1 Vegetation control risk assessment
14.1.2 Control vegetation

Topic 14.1.1 Vegetation control risk assessment

How to identify hazards and assess risks:

- Management of Health and Safety at Work Regulations 1999
- Site hazards e.g. slip trip hazards, overhead / underground services, biological hazards (plant sap etc.)
- Operational hazards – machinery / equipment / use of chemicals

Assessing the risks associated with the site and the proposed works:

- Written risk assessments
- Updating of risk assessment if changes occur to site conditions

How to assess risks and the control measures to be implemented.

Selecting and implementing appropriate working method in accordance with the assessed risks:

- Choice of machinery and equipment- strimmer's, Brushcutter, clearing saws or knapsack sprayers.
- Safe working distances
- PPE

Topic 14.1.2 Control vegetation

How to identify unwanted vegetation and the best method of control:

- Post – planting monitoring requirements, including beat-up assessments
- Types of operation – weeding, brashing, cleaning
- Species identification
- Legal requirements – noxious weeds / invasive plants/ Wildlife & Countryside Act 1981
- Control methods
- Manual
- Motor-manual
- Chemical

How to select appropriate method and equipment for vegetation control:

- Woody growth
- Herbaceous weeds
- Grass
- Competing / excessive vegetation
- Hazardous weeds
- Notifiable weeds

Controlling unwanted vegetation in line with best practice and/or specification:

- Hand weeding
- Mechanical weeding
- Chemical weeding

The use of mulching/mulch mats to aid the control of unwanted vegetation.

Organisational and industry environmental good practice and minimise environmental damage:

- Pollution
- Damage to habitats
- UK Forestry Standard requirements
- Code of Practice for using Plant Protection Products requirements

Maintaining records as appropriate

Removal and disposal of all waste and surplus materials as specified.

- Disposal of organic, inorganic and hazardous waste

The potential impacts of the work on the environment and how these can be minimised:

- Minimising and avoiding damage to surrounding trees, other plants, animals and structures such as fences, paths and signs
- The types of damage acceptable under various circumstances.

The basic implications of:

- Terrain
- Ground conditions
- Vegetation
- Season
- Weather

The impact of using chemicals on the environment and how to minimise environmental damage:

- Control of Pesticides Regulations 1986
- Food and Environment Protection Act 1985
- Control of Substances Hazardous to Health Regulations 2002
- UK Forestry Standard (UKFS) requirements for Forests and Soil
- UK Forestry Standard (UKFS) requirements for Forests and Water

Worker's responsibilities under current environmental, health and safety legislation and codes of practice:

Learning outcome 14.2: Management of vegetation in the forest stand

Topics:

14.2.1 Different woodland habitats and relevant management techniques
14.2.2 Equipment and resources for practical management of woodland habitats
14.2.3 Carry out Practical management of woodland habitats

Topic 14.2.1 Different woodland habitats and relevant management techniques

Learners will understand different woodland habitats including glades, rides, woodland edges, veteran trees, deadwood, ponds, streams, bog, thicket and dense shade etc.

Understand relevant management techniques such as management plans, health and safety, planting/sowing (trees, shrubs and ground flora), natural regeneration, thinning, clearance, coppice, agroforestry and silvicultural systems.

Topic 14.2.2 Equipment and resources for practical management of woodland habitats

Understand both equipment and resources for the practical management of woodland habitats including personal Protective Equipment (PPE) (e.g. boots, safety helmet, waterproof clothing, and gloves etc.), first aid kit, planting equipment, fencing equipment, pruning equipment, saw, tools for vegetation clearance, coppicing tools, maintenance (e.g. cleaning, oiling, sharpening).

Topic 14.2.3 Carry out practical management of woodland habitats

Safely carry out practical management of woodland habitats, such as: planting/sowing (trees, shrubs and ground flora), thinning, clearance, coppice, glade creation, management of woodland rides and edges.

Suggested learning resources

Books

- Willoughby, I 1996. Forestry Commission Research Information Note 274 'Noxious Weeds' ISSN 0267 2375
- Hibberd B. 1991. *Forestry Practice* The Stationery Office Books, ISBN 0117102814
- Willoughby, I & Dewar, J 1995. The Use of Herbicides in the Forest ISBN: 9780117103306

Journals and magazines

- Quarterly Journal of Forestry
- Forestry and British Timber

Websites

- Royal Forestry Society www.RFS.org.uk
- Forestry Commission www.forestry.gov.uk
- Health and Safety Executive www.hse.gov.uk
- Forest Industry Safety Accord www.ukfisa.com

Duty 15: Maintain trees (establishment & maintenance)

What is this duty about?

This unit covers the pruning of trees to improve their shape, form, and timber quality.

Learning outcomes

In this unit, learners will be able to

15.1 Carry out pruning techniques e.g. brashing, formative and high pruning, pruning of saplings and maturing trees

Learning outcome 15.1 Carry out pruning techniques e.g. brashing, formative and high pruning, pruning of saplings and maturing trees

Topics:

15.1.1 The aims and what to consider when pruning trees
15.1.2 Pruning techniques
15.1.3 The reaction (long and short term) of trees in response to pruning
15.1.4 Legislation relevant to pruning trees

Topic 15.1.1 the aims and what to consider when undertaking forestry pruning operations

Learners will understand the common reasons for pruning which should include:

- timber quality
- health and safety
- access for pedestrians and vehicles as well as sight lines
- improve the form or structure
- control of pest and disease

Topic 15.1.2 Pruning techniques

Learners will understand the common pruning techniques used in forestry for example brashing, formative and high pruning, dead-wooding, pollarding. Understand the natural target pruning process, branch collars, branch bark ridge.

Use appropriate tools and equipment to carry out pruning.

Learners will carry out tree pruning by selecting appropriate methods and equipment, as follows:

- correct pruning techniques,
- correct operation of tools and equipment,
- safe working practices
- appropriate disposal of waste,
- Minimising environmental impact

Topic 15.1.3 The reaction (long and short term) of trees in response to pruning

Understand how pruning impacts upon on a tree and how they react to the pruning cuts. Understand how the age, species of trees and environmental constraints affect pruning and a tree's response.

Topic 15.1.4 Legislation relevant to pruning trees

The laws that manage and control pruning operations:

- Wildlife and Countryside Act (1981) (as amended)
- Highways Act 1980
- UK Forestry Standards

Suggested learning resources

Books

- Hibberd B. 1991. Forestry Practice- The Stationery Office Books,
- Starr C. 2005. Woodland Management a Practical Guide
- Agate E. 2002. Woodlands: A Practical Handbook BTCV
- Gilman F. & Lilly S. Best Management Practices Tree Pruning
- Tree Life 2010 (BS3998) Tree work- Recommendations a concise guide
- Arboricultural Association. 1994.*A Guide to Tree Pruning*. Cheltenham: Arboricultural Association. ISBN 090097821X.
- British Standards Institute. 2010. *Tree work - Recommendations (British standard 3998:2010).* London: British Standards Institution.
- G.E., Kirkham T. 2009. *The Pruning of Trees, Shrubs and Conifers*. Portland: Timber Press. ISBN 0881926132.

Websites

- Forestry Industry Safety Accord www.ukfisa.com
- Royal Forestry Society www.RFS.org.uk
- Forestry Commission www.forestry.gov.uk
- Health and Safety Executive www.HSE.gov.uk
- Royal Horticultural Society www.rhs.co.uk
- Arboricultural Society www.trees.org.uk

Forest harvesting option

Duty 16: Measure and select trees for harvesting (harvesting)

What is this duty about?

Mensuration is the determination of dimensions, form, age and increment of single trees, stands or whole woods. This may be standing timber or after felling. Advanced methods of measuring and selecting trees to be harvested.

Learning outcomes

In this unit, learners will be able to:

16.1 Selection of trees for harvesting
16.2 Carry out advanced mensuration technique

Learning outcome 16.1 Selection of trees for harvesting

Topics:

16.1.1 Selection of trees for harvesting

Topic 16.1.1 Selection of trees for harvesting

Yield class:

- The concept of yield class
- Assessing general yield class

Thinning practice:

- Thinning type
- Thinning intensity
- Thinning cycle
- Thinning yield
- Timing of thinning Control of thinning

Learning outcome 16.2 Carry out advanced mensuration techniques

Topics:

16.2.1 Advanced mensuration techniques

Topic 16.2.1 Advanced mensuration techniques

Calculate timber volumes:

- Estimating the volume of a single standing tree
- Methods for estimating the volume of a stand
- Estimating volume from basal area and from height
- Abbreviated tariffing procedures
- Estimating stacked timber volume

- Calculating stacked timber volume
- Log Volume - mid diameter x length (Huber's formula), top diameter x length. Hoppus cubic foot for hardwood logs.
- Weight measurement

Suggested learning resources

Books

- Avery T. and Burkhart H. 2001. Forest Measurements. McGraw-Hill Publishing. ISBN 0071130055
- Burrough PA and McDonnell RA. 1998. Principles of Geographic Information Systems. Oxford University Press. ISBN 0198233655
- Husch B, Beers TW, and Kershaw JA. 2003. Forest Mensuration. Wiley Blackwell. ISBN
- Mackie ED and Matthews RW. 2006. Forest Mensuration: A Handbook for Practitioners. Forestry Commission. ISBN 0855386215
- Mackie ED and Matthews RW. 2008. Timber Measurement. Forestry Commission. ISBN 97800855387495 Philip M. 1994. Measuring Trees and Forests. CABI Publishing. ISBN 0851988830
- Shiver BD and Borders BE. 1996. Sampling techniques for Forest Resource Inventory. John Wiley and Sons. ISBN 0471109401
- West P. 2003. Tree and Forest measurement. Springer Verlang. ISBN 3540403906
- Thinning control- Field Guide. Forestry Commission

Journals and magazines

- Quarterly Journal of Forestry (RFS)
- Forestry & Timber News (Confor)
- Forestry (ICF)
- Forestry Journal
- Essential Arb
- Timber Harvesting

Websites

- Royal Forestry Society www.rfs.org.uk
- Confor www.confor.org.uk
- Forestry Commission www.forestry.gov.uk
- FISA www.ukfisa.com
- Forest Research www.forestry.gov.uk

Duty 17: Harvest trees and prepare timber for extraction (harvesting)

What is this duty about?

Will give the learner a basic understanding of methods to harvest trees. It also looks at the factors to consider when making decisions about harvesting and extraction.

It provides a basic understanding of the cost of bringing timber to market and highlights that decisions made during establishment, maintenance and harvesting will have economic impacts as well as external factors such as market conditions.

Learning outcomes

Learners will be able to

17.1 Understand harvesting systems
17.2 Understand factors affecting bringing timber to the market

Learning outcome 17.1 Understand harvesting systems

Topics:

17.1.1 Harvesting systems

Topic 17.1.1 Harvesting systems

Harvesting systems (tree length system, shortwood system, whole tree system), felling and delimbing methods (manual, motor-manual, mechanised), terrain classification, windthrow risk, machinery optimisation, crop characteristics, market requirements.

When motor manual vs mechanised harvesting should be used:

- Mounted,
- Self-propelled
- Pedestrian operated
- Chainsaws
- Winches
- Harvesters
- Suitability for purpose
- Rate of work
- Operator training and experience,
- Legal implications
- Effectiveness
- Maintenance and servicing (spares availability, dealer support)
- Financial implications (purchase cost, leasing, insurance, servicing and parts, depreciation)
- Compatibility with other machinery

The impact of ground conditions and time of year on harvesting systems:

- Awareness of requirements under control of pollution legislation
- Oil and fuel spillage and storage
- Soil stability and erosion
- Nesting and breeding seasons
- Protected species
- Waste disposal
- Watercourses
- Archaeology
- Brash matting

Why assumptions should not be made about which harvesting system is most appropriate:

- Current relevant legislation and industry guidance
- Adherence to industry safety guidance and operator's manual
- Monitoring machine performance and output
- Effective communications
- Awareness of hazards
- Clearance of blockages
- Awareness of public and work colleagues
- Adherence to specifications
- Use of traction aids
- Safe and efficient operation

Importance of routine and non-routine maintenance

Learning outcome 17.2 Understand factors affecting bringing timber to the market

Topics:

17.2.1 Factors affecting bringing timber to the market

Topic 17.2.1 Supply chain and actors that influence the cost of bringing timber to the market

Timber species and the varying requirements for different markets

- Hardwoods, softwoods
- Cutting size and specification

Timber quality and the varying requirements for different markets

- Strength
- Durability
- Ease of processing

Selection of methods and why a particular technique is chosen

- Motor manual, mechanical harvesting
- Extraction system
- Cutting size and specification

The impact of site and conditions on access

- Ground conditions
- Slope
- Access infrastructure
- Management regime
- Windblow

How market conditions impact the economics of operations

- Distance to market
- Supply and demand
- Market price

Availability and costs of supply chain actors

- Forestry contractors
- Timber haulage contractors
- Appreciation of the basics of job costing e.g. economies of scale
- Small volume high value
- Large volume low value

Suggested learning resources

Books

- Arboricultural Association. 2005. Arboricultural Association Health and Safety Package. Cheltenham: Arboricultural Association. ISBN 0900978406.
- Hibberd B. 1991. Forestry Practice. The Stationery Office Books. ISBN 0117102811
- Ireland, D. 2004. Winching Operations in Forestry: Tree Takedown and Vehicle Debogging. Norwich: Stationary Office Books. ISBN 085538638X.
- Hathaway, L. 1994. Tractors Fundamentals of Machine Operation. Davenport: John Deere Publishing. ISBN 0866912126.
- Southorn, N. 1999. Tractor Operation and Maintenance. Sydney: Inkata Press. ISBN 0750689145. Williams, M. 2000. Tractor Power. Ipswich: Farming Press
- Persson, Per-Erik Working in Harvesting Teams Part 1 and 2. ISBN 97891984173

Journals and magazines

- Quarterly Journal of Forestry (RFS)
- Forestry & Timber News (Confor)
- Forestry (ICF)
- Forestry Journal
- Essential Arb
- Timber Harvesting
- Forest Machine

Websites

- Confederation of Forest industries www.confor.org.uk
- Forestry Industry Safety Accord www.ukfisa.com
- Royal Forestry Society www.RFS.org.uk
- Forestry Commission www.forestry.gov.uk
- Health and Safety Executive www.HSE.gov.uk
- Royal Horticultural Society www.rhs.co.uk

Duty 18: Extract timber

What is this duty about?

A basic understanding of methods for preparing the timber for extraction and extraction methods. It also looks at the factors to consider when making decisions extraction.

A basic understanding of the cost of bringing timber to market and highlights are covered under duty seventeen covering harvesting.

Learning outcomes

Learners will be able to

18.1 Understand different extraction systems

Learning outcome 18.1 Understand different extraction systems

Topics:

18.1.1 Extraction systems

Topic 18.1.1 Extraction systems

Extraction systems, terrain classification, machinery optimisation, crop characteristics, market requirements.

When different equipment should be selected e.g. forwarder vs skidder:

- Line skidders, grapple skidders, forwarders, cable cranes.
- Suitability for purpose
- Effectiveness
- Rate of work
- Operator training and experience,
- Legal implications
- Maintenance and servicing (spares availability, dealer support)
- Financial implications (purchase cost, leasing, insurance, servicing and parts, depreciation)
- Compatibility with other machinery

The impact of ground conditions and time of year on extraction systems:

- Awareness of requirements under control of pollution legislation
- Oil and fuel spillage and storage
- Soil stability and erosion
- Nesting /breeding seasons and protected species
- Waste disposal
- Watercourses
- Archaeology
- Brash matting

Considerations when deciding which extraction system is most appropriate:

- Current relevant legislation and industry guidance
- Adherence to industry safety guidance and operator's manual
- Monitoring machine performance and output
- Effective communications
- Awareness of hazards
- Clearance of blockages
- Awareness of public and work colleagues
- Adherence to specifications
- Use of traction aids
- Safe and efficient operation
- Importance of routine and non-routine maintenance

Planning extraction:

- Plan and mark out routes before work commences
- Consider the terrain extraction routes should be up and down a slope. In thinning's extraction routes should be 1 to 1.25 m wider than the width of machine being used.
- If skidding the timber out the racks should be curved at junctions and main roads to avoid damage to remaining trees

Suggested learning resources

Books

- Arboricultural Association. 2005. Arboricultural Association Health and Safety Package. Cheltenham: Arboricultural Association. ISBN 0900978406.
- Hibberd B. 1991. Forestry Practice. The Stationery Office Books. ISBN 0117102811
- Ireland, D. 2004. Winching Operations in Forestry: Tree Takedown and Vehicle Debogging. Norwich: Stationary Office Books. ISBN 085538638X.
- Hathaway, L. 1994. Tractors Fundamentals of Machine Operation. Davenport: John Deere Publishing. ISBN 0866912126.
- Southorn, N. 1999. Tractor Operation and Maintenance. Sydney: Inkata Press. ISBN 0750689145. Williams, M. 2000. Tractor Power. Ipswich: Farming Press
- Persson, Per-Erik Working in Harvesting Teams Part 1 and 2. ISBN 97891984173

Journals and magazines

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- Forestry & Timber News (Confor)
- Forestry (ICF)
- Forestry Journal
- Essential Arb
- Timber Harvesting
- Forest Machine

Websites

Confederation of Forest industries	www.confor.org.uk
Forestry Industry Safety Accord	www.ukfisa.com
Royal Forestry Society	www.RFS.org.uk
Forestry Commission	www.forestry.gov.uk
Health and Safety Executive	www.HSE.gov.uk

Appendix 1 Mapping of the topics in the Training Specification to the Knowledge, Skills and Behaviours (KSBs)

This table maps the KSBs in the Standard and Assessment Plan to the topics in the Training Specification. The assessment method is noted against the KSBs:

- MT Multiple Choice Test
- P Practical
- D Professional Discussion

Topic	Description	KSBs from Standard / Assessment Plan
Duty 1:	Implement health and safety legislation, industry guidance and organisational policies	
1.1.1	Key legislation relating to health, safety, and welfare	K1: Health and safety legislation, codes of practice (including Forest Industry Safety Accord guidance) and policies, including risk assessment. (MT) K16: Implications of changes in conditions, situations and working environments. (P) S1: Plan, implement, monitor and review health, safety and welfare of self and others, including creating risk assessments, legislative requirements and organisational policies. (P) B5: Puts safety first for themselves and others. (P)
1.1.2	Risk Assessment	
1.1.3	Safe Working methods, policies, and procedures	
1.1.4	Incidents and accidents	
1.1.5	Consequences of not complying with statutory duties	
1.1.6	How individuals can contribute to establishing a good health and safety culture	
Duty 2:	Implement biosecurity legislation, industry guidance and organisational policies Duty 3: Implement pollution control in line with legislation, industry guidance and organisational policies	
1.2.1	Forestry legislation and codes of practice	

1.2.2	Environmental and ecological surveys	K2: Biosecurity and environmental legislation, codes of practice and policies including pollution control. (MT) S2: Plan, implement, check and report environmental mitigation measures, including legal compliance, organisational policies and risk assessment. (P) S13: Store and dispose of waste in accordance with regulations, for example chemicals, organic and inorganic waste, pollution and biosecurity controls. (P)
1.2.3	Pollution and climate changes	
2.1.1	Plant health legislation and policies	
2.1.2	Biosecurity measures	
2.1.3	Plant health reporting	
3.1.1	Pollution control legislation and policies	
3.1.2	Pollution incidents	
3.1.3	Pollution control reporting and record keeping	
Duty 4	Plant trees	
4.1.1	Identify common tree species growing in the UK, and plant species associated with growing trees from samples	K4: Methods to identify trees and woodland plants including botanical keys taking account of seasonality. (MT) S3: Identify common forestry trees and woodland plants using scientific names. (MT) K5: Plant and tree biology, physiology, lifecycles, growing conditions, landscape and timber properties. (MT)
4.1.2	Processes of plant physiology and anatomy	
4.1.3	Life cycle of plants	
4.1.4	Describe the preferred growing conditions of tree species	
4.1.5	Describe the different timber uses of tree species	
4.1.6	Explain the effects that tree properties have on the type of work that is carried out on them	
4.2.1	Silviculture practices in the UK	K3: Principles of silvicultural practice in the UK including those most commonly used, their application, and the UK Forestry Standard. (MT) K18: The environmental, social and economic value of sustainable forest management. (MT)
4.2.2	Managing woodland in accordance with UK Forestry Standards (UKFS)	
4.5.1	Check plants and materials	S6: Plant trees including providing support and protection. (P)

4.5.2	Transport and storing plants and materials	(S14) Load, unload and transport materials and equipment relative to the business. (P) S16: Store and handle trees to minimise negative impacts and maximise establishment potential. (P) K8: Techniques for planting, supporting and protecting trees and their suitability to different situations including site conditions. (P) K19: Methods for storing, transporting and handling trees and importance for tree health and establishment. (P) K9: Implications of tree establishment activities on the end product and impact on decision-making process. (MT)
4.5.3	Plant trees	
4.5.4	Post planting protection	
Duty 5	Clear vegetation	
5.1.1	Control unwanted vegetation	K7: Techniques for felling small trees and removing unwanted vegetation. (D) S5: Identify and control unwanted vegetation including felling small trees using hand and motor manual tools. (D) B4: Ability to work outdoors in all weather conditions. (D) *NB K7 and S5 split with 'fell small trees' in Duty 7*
Duty 6	Measure and select trees for removal	
6.1.1	Basic mensuration techniques and terminology	K6: Techniques for measuring standing trees. (P) S4: Measure trees for assessment of timber volumes. (P)
Duty 7	Fell Small Trees	
7.1.1	Assess risks prior to felling and cross cutting operation	K7: Techniques for felling small trees and removing unwanted vegetation. (D)
7.1.2	Felling equipment	

7.1.3	Methods for felling and cross cutting selected small diameter trees	S5: Identify and control unwanted vegetation including felling small trees using hand and motor manual tools. (D) *NB K7 and S5 Split. Control vegetation in Duty 5*
7.1.4	Techniques to deal with a tree that has sat back against the intended felling direction	
7.1.5	Use of organised felling systems	
7.2.1	The learner will know and be able to use a range of felling techniques to fell trees up to 200mm	
Duty 8	Maintain Forest infrastructure	
8.1.1	Maintenance and repair of forest infrastructure	K11: Maintenance requirements for forest infrastructure, for example boundaries and rides. (P) S7: Monitor and maintain forest and woodland infrastructure for example boundaries and rides. (P) B1: Takes ownership of work including attention to detail, spatial awareness and stamina. (P)
Duty 9	Operate and maintain forestry tools, equipment and machinery	
9.1.1	Prepare equipment tools and machine for maintenance	K12: Maintenance, operational requirements and legislation for tools, equipment, machinery, vehicles and attachments. (P) S8: Operate and maintain tools, equipment and machinery safely in line with legislation and manufacturers guidance, for example winches, chainsaws or tractors. (P)
9.1.2	Ensure the equipment and machines requiring maintenance are safe and completely isolated from the power source.	
9.1.3	Take the correct precautions to minimise dangers and deal with waste safely and correctly in accordance with legislation	
9.1.4	Ensure that the work area is safe and, in a condition, suitable for the maintenance procedure	

9.1.5	Maintain equipment and machines in accordance with manufacturer's instructions standard procedures, legislation, policies and procedures	
9.1.6	Identify the need for advice and assistance and refer to the appropriate person	
9.1.7	Ensure repaired equipment and tools are in safe working order	
9.1.8	Clean, service and store maintenance tools safely and effectively	
Duty 10	Monitor and control plant pests, diseases and disorders	
10.1.1	Plant health legislation, policies, and procedures	K13: Techniques for identification and control of tree pests, diseases and disorders, including impacts of pests and diseases on timber and the wider environment, and the principles of Integrated Pest Management (IPM). (D) S9: Monitor and control the impact of pests, diseases and disorders. (D)
10.1.2	Monitoring trees	
10.1.3	Identifying pests, diseases, and disorders	
10.1.4	Reporting and recording (pests, diseases and disorders	
10.1.5	Controlling pests, diseases and disorders	
10.1.6	Principles of Integrated Pest Management (IPM)	
Duty 11	Maintain records including digital records	
Duty 12	Communicate with supervisors, colleagues, public and others	
11.1.1	Maintain records including digital records and reports	K10: Timber supply chain (for example timber markets and processing) and the actors within it including roles and responsibilities. (MT) K14: The importance of maintaining records including digital records and reports. (D)
12.1.1	Communicate with supervisors, colleagues, public and others	

12.1.2	Key roles when delivering Forestry works and their responsibilities	K15: Techniques for communicating with technical and non-technical audiences and the importance of effective communication in the workplace with colleagues, customers and the public. (D) S10: Maintain records including digital records and reports. (D) S11: Communicate to technical and non-technical audiences including the use of verbal and written techniques. (D) S15: Process information and communicate using digital technology for example emails, word processing software, video meeting software or applications for recording and sharing information. (D) B6: Respectful of others and tailors communication to audience. (P)
12.1.3	The importance of effective interpersonal skills in the workplace	
12.1.4	Recording a portfolio of experience	K17 the importance of recording a portfolio of experience and learning to aid career progression. (MT)
Duty 13	Use geographical tools including Global Positioning Systems (GPS), maps and plans	
13.1.1	Use geographical tools including Global Positioning Systems (GPS), maps and plans	S12: Interpret maps, plans and Global Positioning Systems (GPS). (P)

Establishment and Maintenance Option

Duty 14	Manage vegetation	
14.1.1	Vegetation control risk assessment	K20: (Establishment & maintenance) Techniques for protecting and maintaining plants after planting including purpose, timings and suitability to site conditions. (D)
14.1.2	Control vegetation	
14.2.1	14.2.1 Different woodland habitats and relevant management techniques	

14.2.2	Equipment and resources for practical management of woodland habitats	K22: (Establishment & maintenance) Methods for controlling vegetation or pests by chemical means (for example pesticides or organic equivalents). (D) S17: (Establishment & maintenance) Protect and maintain plants after planting including weeding, cleaning, re-spacing, beating up and application of products to prevent unwanted vegetation (for example mulch mat). (D) S19: (Establishment & maintenance) Control vegetation or pests by chemical means (biocides or organic equivalents). (D)
14.2.3	Carry out Practical management of woodland habitats	
Duty 15	Maintain trees	
15.1.1	The aims and what to consider when forestry pruning operations	**K21: (**Establishment & maintenance) Methods of managing and controlling unwanted vegetation throughout the life cycle of the tree(s). (P) **S18:** (Establishment & maintenance) Improve quality of tree crop, including brashing and formative pruning. (P)
15.1.2	Pruning techniques	
15.1.3	The reaction (long and short term) of trees in response to pruning	
15.1.4	Legislation relevant to pruning trees	

Harvesting Option

Duty 16	Measure and select trees for harvesting	
16.1.1	Selection of trees for harvesting	**K24:** (Harvesting) Techniques for calculating timber in standing and felled trees. (P) **S24:** (Harvesting) Calculate timber volumes using mensuration techniques. (P)
16.2.1	Advanced mensuration techniques	

Duty 17	Harvest trees and prepare timber for extraction	
17.1.1	Harvesting systems	**K23:** (Harvesting) Harvesting and extraction systems including tree felling and the factors affecting the cost of bringing timber to market. (D) **S20: (**Harvesting) Select trees for harvesting. (D) **S21: (**Harvesting) Fell large trees motor-manually including use of assisted fell techniques. (D) **S22:** (Harvesting) Use hand winches in forestry. (D)
17.2.1	Factors affecting bringing timber to the market	
Duty 18	Extract timber	
18.1.1	Extraction systems	**S23:** (Harvesting) Prepare timber for extraction including snedding, measuring, cross cutting and sorting timber to product specification. (P)