



# **Agriculture, Environmental and Animal Care: Agriculture, land management and production**

**T Level outline content: draft version**

**June 2020**

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# Introduction

## Outline content

This outline content has been produced by [T Level panels](#) of employers, professional bodies and providers, and is based on the same standards as those used for apprenticeships. The outline content will form the basis of the specifications for T Level Technical Qualifications, which will be developed by awarding organisations for approval by the Institute for Apprenticeships and Technical Education. One awarding organisation will be appointed to develop and deliver each Technical Qualification following a procurement process.

Colleges and other education and training providers will decide how to structure the T Level courses they offer, based on the qualification specifications. This will enable them to deliver the study programme's mandatory components in the most effective way for students.

A T Level programme consists of a Technical Qualification, substantial industry placement, English and maths, and other occupation-specific requirements where essential for entry to skilled employment. This outline content relates solely to the Technical Qualification part of a T Level programme.

Further information about T Levels is available on the website of the Institute for Apprenticeships and Technical Education here: [www.instituteforapprenticeships.org](http://www.instituteforapprenticeships.org), and at [www.education.gov.uk](http://www.education.gov.uk).

# **Agriculture, Environmental and Animal Care: Agriculture, land management and production pathway**

Awarding organisations will need to ensure that students have an up-to-date knowledge of the legal and regulatory obligations relating to employment in the occupations relevant to the T Level and understand the practical implication of these on their work.

Maths, English and digital skills are set out in a separate annex. Awarding organisations should integrate these within the qualification so that they are applied in occupationally relevant contexts.

## **Core content**

The core content relates to the whole route 'route core'. The core knowledge and understanding is assessed through an examination and core skills through a practical employer-set project.

The core knowledge and understanding focuses on the students' knowledge and understanding of contexts, concepts, theories and principles relevant to the T Level. This could include, where appropriate, assessment of knowledge and understanding relevant to the route and the pathway.

The employer-set project provides the opportunity to develop and apply a minimum range of core skills important for employability. The allocation of content to each type of assessment will need to be approved by the Institute for Apprenticeships and Technical Education.

## Core knowledge and understanding across Agriculture, Environmental and Animal Care Route

Element	Content
Sustainability	<p data-bbox="472 344 1123 383">Key requirements of environmental legislation</p> <ul data-bbox="520 412 1347 488" style="list-style-type: none"> <li data-bbox="520 412 1347 488">• associated obligations for businesses, their employees and other stakeholders.</li> </ul> <p data-bbox="472 517 1238 555">Key government environmental policies and initiatives</p> <ul data-bbox="520 584 1311 757" style="list-style-type: none"> <li data-bbox="520 584 1311 660">• the opportunities and risks they bring to agriculture, environmental and animal care sector</li> <li data-bbox="520 674 1311 757">• the associated environmental performance measure e.g. water and energy use.</li> </ul> <p data-bbox="472 786 1050 824">The concept of sustainable development</p> <ul data-bbox="520 853 1366 1115" style="list-style-type: none"> <li data-bbox="520 853 1366 929">• sustainable development goals at a macro (national and international) and micro (business) level</li> <li data-bbox="520 943 1311 1064">• types of sustainable solutions to meet development goals including social, environmental, economic and human</li> <li data-bbox="520 1077 1248 1115">• concerns and expectations of key stakeholders.</li> </ul> <p data-bbox="472 1144 1353 1220">The concept of climate change and scientific views on causes and impacts</p> <ul data-bbox="520 1249 1366 1467" style="list-style-type: none"> <li data-bbox="520 1249 1366 1370">• the impact of increased rainfall and higher temperatures upon environments, conservation practices, habitats, flora, fauna and water levels</li> <li data-bbox="520 1384 1299 1467">• policies and initiatives to manage these changes at national and local level.</li> </ul> <p data-bbox="472 1496 1315 1534">Waste management principles (e.g. recycle, reduce, reuse)</p> <ul data-bbox="520 1563 1305 1780" style="list-style-type: none"> <li data-bbox="520 1563 1168 1601">• key requirements of associated legislation</li> <li data-bbox="520 1615 1295 1691">• types of materials that require specific actions (e.g. asbestos)</li> <li data-bbox="520 1704 1305 1780">• measures in place by the sector and organisation to meet requirements.</li> </ul>

<p>Biosecurity</p>	<p>Principles of biosecurity</p> <ul style="list-style-type: none"> <li>• factors influencing biosecurity e.g. international trade, new technologies</li> <li>• biosecurity risk factors in different types of agriculture, environmental and animal care situations</li> <li>• biosecurity measures including inspection, monitoring, regulation, passports, isolation and their importance in maintaining health production and service environments.</li> </ul>
<p>Working in the agriculture, environmental and animal care sector</p>	<p>Employment rights and responsibilities (e.g. union membership, working hours) of the employer and employee</p> <ul style="list-style-type: none"> <li>• expectations of professional conduct and behaviours in the workplace (including punctuality, cleanliness, respect for own and others work and work area, respect for the land, property and belongings of others (including animals)</li> <li>• typical activities that can lead to disciplinary and grievance procedures</li> <li>• how these expectations are met and demonstrated by employees.</li> </ul> <p>Principles of effective teamwork</p> <ul style="list-style-type: none"> <li>• how teams are developed, including the role of the team leader</li> <li>• team dynamics and how they are managed, and behaviours influenced</li> <li>• qualities of effective team members and team leaders and how these qualities are demonstrated</li> <li>• the importance of team work to team and project performance</li> <li>• techniques used to monitor and manage individual and team performance e.g. goal and objective setting, performance management reviews, providing constructive feedback</li> <li>• techniques used to manage team conflict (e.g. mediation) and when and how they should be applied.</li> </ul>

<p>Working in the agriculture, environmental and animal care sector (continued)</p>	<p>Progression opportunities which exist within the agriculture, environmental and animal care sector</p> <ul style="list-style-type: none"> <li>• the purpose of continuing professional development (CPD) and the benefits it brings to the individual and their employer</li> <li>• methods of personal and professional development (e.g. coaching, independent research) and the types of organisations that can provide this type of support, including professional bodies.</li> <li>• their suitability for achieving planned outcomes.</li> </ul>
<p>Ethics</p>	<p>Ethical principles (e.g. honesty, transparency, justice)</p> <ul style="list-style-type: none"> <li>• how these are used in codes of conduct, employment terms and conditions and workplace policies</li> <li>• how these are represented by ethical behaviours</li> <li>• how these are incorporated into business ethics</li> <li>• how these impact on business operations, including interaction with stakeholders and the supply chain.</li> </ul>
<p>Supply Chain</p>	<p>The supply chain</p> <ul style="list-style-type: none"> <li>• different types of organisations involved and their role</li> <li>• different ways in which the supply chain is sequenced and operates</li> <li>• implications of failing to meet supply chain demands</li> <li>• environmental impact of the supply chain including whole life cycle of a product</li> <li>• types of procurement (e.g. competitive bidding, direct purchase) and their suitability for different situations.</li> </ul> <p>Principles of stock management (including stock rotation, storage, conditions, monitoring stock levels, ordering stock, dealing with deliveries, maintaining records)</p> <ul style="list-style-type: none"> <li>• how they are applied in different types of business</li> <li>• implications to businesses of ineffective processes.</li> </ul>

Business	<p>The types of business organisations e.g. sole trader, partnership, limited company, not for profit</p> <ul style="list-style-type: none"> <li>• common business structures and hierarchies</li> <li>• the financial, legal and commercial implications of type of business</li> <li>• typical organisational policies and their relationship to legislation</li> <li>• types of business objectives and values associated with different business structures.</li> </ul> <p>The principles of enterprise skills e.g. risk taking, innovation, resilience</p> <ul style="list-style-type: none"> <li>• how they are applied to develop business growth and change including sales opportunities and diversification of the business</li> <li>• types of business risk (e.g. financial, reputational) and risk management methods that can be deployed.</li> </ul> <p>How businesses measure success (including Key Performance Indicators (KPIs), Service Level Agreements (SLAs), benchmarking, supply chain requirements)</p> <ul style="list-style-type: none"> <li>• the information used to determine if success measures are met</li> <li>• quality standards, quality control and quality assurance <ul style="list-style-type: none"> <li>○ their purpose, differences and application to organisations quality standards expected by internal and external stakeholders and associated quality assurance requirements e.g. audits.</li> </ul> </li> </ul> <p>The principles of project management (including purpose and scope of the project, milestones and timescales, supply chain, people management, resources, budgeting).</p>
Equality	<p>Factors to consider (including equality legislation, cultural differences, religious needs) when working with people from diverse backgrounds and cultures</p> <ul style="list-style-type: none"> <li>• how to show empathy and respect to those from different backgrounds and cultures to our own</li> <li>• acceptable and unacceptable behaviours and language.</li> </ul> <p>Characteristics protected by equality legislation.</p>



Communication	<p>Different types of communication (including verbal, non-verbal and digital)</p> <ul style="list-style-type: none"> <li>• the formats used for the types of communication (e.g. business reports, emails, letters, websites) and associated business conventions</li> <li>• the types and value of images and visual aids to support written text and oral presentations</li> <li>• their suitability for different purposes and audiences</li> <li>• the importance of spoken language, body language and tone in communication and how each is used to convey different messages to different audiences for different purposes</li> <li>• the benefits and limitations of social media including risk of misuse, promoting the business.</li> </ul>
Relationship Management	<p>Principles of customer care (including first impressions, representing business and self, supporting customers, the difference between customer wants and needs, the importance of accurate knowledge, working to an expected timescale)</p> <ul style="list-style-type: none"> <li>• how these can be applied when dealing with different stakeholders, including internal customers</li> <li>• legal requirements (including legislation relating to consumer protection) when interacting with different types of customers and customer relationships including business to business (B2B)</li> <li>• typical procedures used to deal with customer disputes and complaints, including escalation to relevant individuals and departments</li> <li>• how to apply customer service principles and the benefits to the individual (e.g. increased motivation, positive feedback) and business (e.g. customer loyalty, customer confidence).</li> </ul> <p>Roles of different stakeholders including internal and external customers</p> <ul style="list-style-type: none"> <li>• their expectations</li> <li>• interrelationships between stakeholders.</li> </ul>

Finance	<p>The concept of profit</p> <ul style="list-style-type: none"> <li>• types of profit (including net and gross) and significance of each to business success</li> <li>• types of cost incurred by business (products, ancillary products, types of overheads, labour), their classifications (direct, indirect, fixed, variable)</li> <li>• measures used to reduce costs and implications of using these to profitability, reputation and quality</li> <li>• types of taxation (including payroll, business)</li> <li>• how costs and revenue are forecast</li> <li>• how profit is calculated.</li> </ul>
Health and Safety	<p>Key requirements of health and safety legislation e.g. for lone working, safe manual handling</p> <ul style="list-style-type: none"> <li>• the respective duties imposed on employees and employers</li> <li>• the importance of taking personal responsibility for health and safety of self and others</li> <li>• the techniques and methods used to comply with legislation e.g. use of Personal Protective Equipment (PPE), regular communication with lone workers.</li> </ul> <p>The purpose of risk assessments</p> <ul style="list-style-type: none"> <li>• typical structures and content</li> <li>• how they are developed and used</li> <li>• implications for poor development and application.</li> </ul> <p>Hazards and risks associated with working in the agriculture, environmental and animal care sector (e.g. working with hazardous materials, lone working)</p> <ul style="list-style-type: none"> <li>• typical control measures in place to minimise risks, including the types of PPE used, fatigue and stress management for lone workers.</li> </ul> <p>Procedures to follow when dealing with emergency situations e.g. spilt cleaning materials, slurry exposure, flooding.</p>

Information and data	<p>Key requirements of legislation relating to the security of information and data</p> <ul style="list-style-type: none"><li>• types of information and data protected by legislation including client data, intellectual property</li><li>• methods used by businesses to manage information and data including version control, access controls, indexing, cyber security.</li></ul>
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## Employer-set project

The employer-set project ensures students have the opportunity to combine core knowledge and skills to develop a substantial piece of work in response to an employer-set brief. The employer-set project forms part of the Technical Qualification and is a separate part of the T Level programme to the Industry Placement.

To ensure consistency in project scope and demand, awarding organisations will develop assessment objectives, which require students to:

- plan their approach to meeting the brief
- apply core knowledge and skills as appropriate
- select relevant techniques and resources to meet the brief
- use maths, English and digital skills as appropriate
- realise a project outcome and review how well the outcome meets the brief

The awarding organisation will work with a relevant employer or employers, to devise a set brief that:

- ensures a motivating starting point for students' projects, for example, a real-world problem to solve
- ensures students can generate evidence that covers the assessment objectives
- is manageable for providers to deliver
- is officially approved by the awarding organisation and employer

For Agriculture land management production, in achieving the assessment objectives and meeting the brief, students must demonstrate the following core skills:

- **Analysing**
  - e.g. identifying common features of data obtained on options to improve a business' environmental impact, classifying and organising data into types, discerning patterns.
- **Communicating**
  - e.g. using visual and oral methods to engage an audience with proposals for improving representation and diversity in the sector.
- **Critical thinking**
  - e.g. questioning information and data, evaluating pros and cons of the introduction of new machinery or plant into a business, taking out of the whole life cycle.

- **Decision making**

- e.g. identifying likely impact of skills scarcity in the business and using evidence to substantiate conclusions.

- **Investigating**

- e.g. developing search criteria/queries for secondary research and designing and carrying out tests for primary research into the environmental impact of a business.

- **Working in a team**

- e.g. developing and implementing a communication plan for the introduction of a new lone working policy.

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## Occupational Specialist Content

Specialist content is structured into different occupational specialisms, which correspond to the apprenticeship standards listed on the relevant occupational map. Occupational specialisms ensure students develop the knowledge and skills necessary to achieve a level of competence needed to enter employment in the occupational specialism, and are organised around 'performance outcomes' that indicate what the student will be able to do, as a result of learning and applying the specified knowledge and skills.

There are some content areas that are included in both the Core and Occupational Specialism sections, this is intentional. Where in Core, it is because it is content that is applicable to all Agriculture, Environmental and Animal Care students, regardless of the occupational specialism. If the same content is also in the Occupational Specialism, it is because the knowledge and skills need to be developed within the context of the Performance Outcome. In the occupational specialism, it is therefore likely to require different content to reflect the Performance Outcome.

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# Occupational Specialist Content

## Occupational Specialism: Tree and woodland management and maintenance

### Performance Outcome 1: Grow trees and woodlands

Knowledge Specific to Performance Outcome	Skills
<p><b>Health and safety</b></p> <p>Typical hazards and risks associated with growing trees and woodlands (e.g. soil and water borne diseases) and control measures to be put in place to mitigate these risks.</p> <p><b>Environment</b></p> <p>Characteristics of ecosystems found in different landscapes (e.g. parks, woodland)</p> <ul style="list-style-type: none"> <li>the contribution made by trees to ecosystems and habitats including ecosystems services</li> <li>the role of trees, wood and woodlands in the carbon, water and nutrient cycles</li> <li>how ecosystems affect tree planting decisions.</li> </ul> <p>The health, environmental and economic benefits and limitations of trees and green infrastructure in urban areas and woodland</p> <ul style="list-style-type: none"> <li>how benefits are increased</li> <li>how limitations are minimised</li> <li>products and uses e.g. timber, recreation and learning</li> <li>how benefits and limitations affect tree planting decisions.</li> </ul> <p><b>Business</b></p>	<p>Sow seeds.</p> <p>Take cuttings.</p> <p>Prepare cuttings for propagation.</p> <p>Graft trees.</p> <p>Bud trees.</p> <p>Pot plants.</p> <p>Spray materials onto tree stocks.</p> <p>Obtain information on sources of tree stocks from different information sources.</p> <p>Clear sites for tree growth operations using hand tools and mechanical equipment.</p> <p>Assess soil type and condition.</p> <p>Prepare soils and growing media for tree planting.</p> <p>Assess condition of tree stock.</p> <p>Dig planting pits.</p> <p>Position trees to planting plan and planting line.</p> <p>Apply tree protection materials e.g. mulch.</p> <p>Apply tree supports.</p> <p>Measure quantities of materials with precision.</p> <p>Convey technical information to different audiences.</p>

Similarities and differences in how arboriculture and forestry organisations obtain revenue

- how arboriculture and forestry organisations maximise revenue generation opportunities.

Organisations in the supply chain and their role

- the role of the marketplace in determining price
- the factors that affect price
- how this is used to support tree planting decisions.

Factors that can affect profitable tree and woodland operations e.g. additional time, increased waste, damage to the environment

- methods used to minimise negative factors during preparation, operation and post operation.

### **Tools and materials**

Types of tools (e.g. grafting knife, spade materials (e.g. stakes, ties) required for tree planting related operations

- their characteristics
- function
- preparation requirements e.g. checks/inspections, adding materials, calibration
- operation
- suitability for carrying out tasks in different environments
- maintenance and storage requirements to manufactures' requirements.

### **Tree biology, botany and health**



The characteristics of different types of parts of a tree including leaf, bud, flower, seed, reproductive parts, branches, stems, basal flare, root

- their function
- structure
- their role in the tree life cycle
- how they interrelate to support each other
- processes involved in tree development e.g. photosynthesis, respiration, transpiration, reproduction
- implications of tree growth from dysfunction in tree parts and processes

Plant growth responses e.g. phototropism, gravitropism, thigmotropism, hydrotropism.

Factors affecting plant growth and development including environmental, microclimate, light, water, nutrients

- typical plant responses to these factors.

Tree root growth and morphology and the implications on tree survival and the immediate growing environment.

Abiotic and human causes of ill health and damage to trees

- their symptoms
- implications for growth and development.

Typical pests, (e.g. moths, beetles, aphids, mammals)

- their characteristics (including life cycle, dispersal)
- methods of prevention
- implications of pests to tree growth and development

- the benefits and limitations of treatment options
- monitoring and risks of contagion to other trees and the local environment.

Typical pathogens, (e.g. rusts, blotches, bracket fungi, phytophthora), their characteristics (including life cycle, dispersal)

- implications to tree growth and development
- methods of prevention
- the benefits and limitations of treatment options
- monitoring and risks of contagion to other trees and the local environment.

Tests (including soil and foliar sampling) and associated technology (e.g. chlorophyll fluorimeter)

- samples to be taken
- how samples are taken
- when samples are taken
- why samples are taken
- information provided by samples on ill health.

Key responsibilities under plant health legislation when planting trees.

### **Tree stocks and Tree Planting**

Principles and purpose of nomenclature and taxonomy systems

- position of trees and shrubs within the taxonomy of the wider kingdom
- characteristics and morphology of common tree and shrub families, genera, species and variety at differing life stages
- techniques (including botanical keys) and information sources (e.g.

literature, digital technology) to aid correct identification

- the value of using and writing scientific names and implications for improper use
- types and use of tree tags and signs.

Different types of propagation including by seed, cuttings, grafting, budding, layering

- how materials (e.g. seed, cutting) are obtained
- the processes involved
- the benefits and limitations of each type
- their suitability for different species and environments
- identifying features of each type used.

Factors that influence the choice of tree species (including biological, ecological and economic)

- how they affect decision making for different environments (e.g. urban, parkland, woodland)
- how they impact on meeting different management objectives (e.g. timber, amenity, shade, habitat).

Characteristics of different tree planting stock types (e.g. containerised, root ball, whips, plugs) and their suitability for different environments.

Characteristics of good quality stock plants (e.g. health, size, root stock)

- how to grow trees of good health
- how these are used to assess the condition of plants and materials against specification.

Characteristics of responsible sources for tree stocks including biosecurity measures, sustainable propagation, working practices of labour.

Tree planting techniques (e.g. pit, notch, tree spade), including support and protection

- their suitability for different stock types (e.g. whips, standards, semi mature) and environments (e.g. exposure, vandalism) and purpose (e.g. restocking, afforestation, specimen plants, amenity plantings)
- how they are applied including equipment and materials required.

Types of aftercare for establishing trees in both forestry and arboriculture environments e.g. formative pruning, tie and stake adjustment, pest and disease control

- how they encourage independence in the landscape, growth and development
- their implications for long term tree management, function and wood quality
- factors affecting their application (e.g. aspect, stock type)
- how they are applied in after tree planting.

Tree planting plans in arboriculture and forestry

- information required from site survey to recommend species, stock, protection, support and aftercare.
- specifications for planting stock
- design and format of plans and sketches including locations of

trees, stock and planting specifications.

- marking out of site.

### **Soils and growing media**

The properties of different types of site soils (e.g. clay, sandy) and growing media for propagation (e.g. peat, peat free, vermiculite)

- characteristics
- how soils and growing media are formed
- their impact on tree selection and growth
- methods of assessment.

Techniques for preparing (e.g. drainage), cultivating (e.g. ploughing) protecting (e.g. mulching, erosion prevention) and manipulating (e.g. fertilisation, aeration) soils and growing media for tree growth

- the suitability of techniques for different soils and growing media, environments and tree species
- how they are applied in practice.

### **Woodland management and maintenance**

Growing trees by artificial and natural regeneration

- benefits and limitations of each approach to meet different management and site objectives e.g. improving timber quality, timber quantity
- factors (e.g. space, light, shade) that affect successful establishment and how these are used to support management decision-making.

### **Information**

Types of information required for growing tree operations including work specifications, tree planting plans, different types of maps (including Ordnance Survey (OS), sketches, computer aided (CAD))

- their content and format
- conventions and symbols
- how they are produced
- how they are used in planning and carrying out operations.

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## Performance Outcome 2: Undertake complex felling operations

Students must develop skills to carry out complex felling operations with a chainsaw in a woodland area and with an obstacle for rigging.

Knowledge Specific to Performance Outcome	Skills
<p><b>Health and safety</b></p> <p>Typical hazards and risks associated with undertaking complex felling operations (e.g. falling debris, power lines), and control measures to be put in place to mitigate these risks.</p> <p>Responsibilities of key roles in felling sites in relation to the FISA Guidance on Managing Health and Safety in Forestry document.</p> <p><b>Environment</b></p> <p>Environmental legislation, regulations and codes of practice relating to conservation, plant health, wildlife, pollution and water quality</p> <ul style="list-style-type: none"> <li>• relationship between legislation, regulations and codes of practice</li> <li>• responsibilities placed on organisations by environmental legislation, regulations and codes of practice when planning and carrying out felling activities.</li> </ul> <p>The purpose of environmental risk assessments,</p> <ul style="list-style-type: none"> <li>• their relationship with other documents e.g. forestry management plan</li> <li>• the content of an environmental risk assessment</li> <li>• how environmental risk assessments are conducted</li> <li>• the site factors that need to be incorporated into an environmental risk assessment (e.g. terrain, ground</li> </ul>	<p>Inspect lifting equipment.</p> <p>Locate trees to be felled from information sources e.g. a map, planting plan.</p> <p>Set out worksite signage and controls (highway &amp; non highway).</p> <p>Prepare tools and machinery for use including hand tools, chainsaw, wood chipper.</p> <p>Clean tools and machinery.</p> <p>Operate tools and equipment on and off ground.</p> <p>Fell trees over 380mm with assisted felling techniques.</p> <p>Fell trees using aerial rigging techniques.</p> <p>Support aerial tree rigging operations from the ground.</p> <p>Cut wood using step cuts.</p> <p>Cut wood using directional cuts.</p> <p>Cut timber to length.</p> <p>Manually move and stack timber e.g. roll, lift, use of aids.</p> <p>Lift and drag branches.</p> <p>Rake ground to clear debris.</p> <p>Sort timber to product specification.</p> <p>Load a woodchipper.</p> <p>Make good the felling area.</p>

<p>conditions, vegetation type, season, weather, proposed operations, management approach) their interrelationships and how they are managed</p> <p><b>Business</b></p> <p>Stakeholders in the supply chain (including land/tree owners, land agents, contractors, subcontractors, Forest Works Manager) and their role</p> <ul style="list-style-type: none"> <li>• the role of the marketplace in determining price and the factors that affect price</li> <li>• the relationship between price and management decisions (e.g. thinning).</li> </ul> <p>Factors that can affect profitable tree and woodland operations e.g. distance to market, timber quality site access, obstacles</p> <ul style="list-style-type: none"> <li>• Options available to minimise negative factors during preparation, operation and post operation (tools, equipment, labour).</li> </ul> <p><b>Tools, equipment and machinery</b></p> <p>Types of tools (e.g. felling bar, wedges), equipment (e.g. Personal Protective Equipment) and machinery (e.g. chainsaws, wood chippers, forwarders) required for tree felling, tree work, and woodland work-related operations</p> <ul style="list-style-type: none"> <li>• their characteristics</li> <li>• function</li> <li>• preparation requirements e.g. checks/inspections, adding materials, calibration</li> <li>• operation</li> </ul>	<p>Undertake routine biosecurity measures e.g. removing debris and soil from clothing, clean machinery and equipment before leaving a site.</p> <p>Use rules and formulae to determine rigging data.</p> <p>Assess health and safety risks.</p>
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- suitability for carrying out tasks in different environments
- maintenance and storage requirements to manufactures requirements.

### **Tree biology, botany and health**

Characteristics of unhealthy or structurally weak trees (including dieback, bulges, slenderness, infection, infestation, cavities, broken branches, compression and tensile forks, fibre buckling, cracks, ribs, hazard beams)

- causes of defects
- implications for tree felling and forest products.

Characteristics of species causing decay in trees (e.g. *Meripilus giganteus*, *Inonotus hispidus*)

- implications for felling operations
- implications for timber use.

Characteristics of defects in timber (e.g. knots, grain)

- and how this affects felling decisions and operations.
- grading of timber
- potential uses of timber of different grades.

Factors affecting the quality of timber (including tree planting and establishment techniques, storage, handling) and how these are optimised to maximise yield and quality.

### **Preparing for felling operations**

The principles of site management including,

- logistics

- allocation of resources (time, labour, equipment, materials)
- decision-making and problem-solving responsibilities
- the role of the Forest Works Manager
- activities to be undertaken and their application in both arboriculture and woodland contexts.

Types of infrastructure that may be encountered when carrying out tree and woodland operations e.g. roads, power lines

- key requirements of related legislation
- implications for planning and completing felling operations.

Features and designations (e.g. of ancient monuments, archaeological digs) of sites where tree and woodland operations take place including terrain, buildings, ground conditions, climate and microclimate, geology, hydrology, existing tree species, access, timing, habitats and their effect on

- the preparation for felling operations
- the types of felling operations that can be undertaken
- successfully meeting objectives.

Potential damage to the environment caused by tree and woodland felling operations

- causes of damage
- levels of damage acceptable
- how unacceptable levels can be prevented including techniques, materials and equipment to be used.

### **Information**

Reference sources of information for undertaking tree and woodland work

operations including British Standards (e.g. BS3998), Industry Codes of Practice (ICoPs), AFAG/FISA Guidance (Arboriculture and Forestry Advisory Group/Forest Industry Safety Accord), manufactures guidance.

- the information provided
- their status in relation to regulatory and legal requirements.

Types of information required for tree and woodland management and operations including work specifications, tree planting plans, different types of maps (including Ordnance Survey (OS), sketches, computer aided (CAD))

- their content and format
- conventions and symbols
- how they are produced
- how they are used in planning and carrying out operations.

### **Tree work and felling operations**

Tree and woodland operations including:

- felling of small trees up to 380mm with hand tools and chainsaws
- felling of larger trees over 380mm
- assisted felling techniques including winching
- sectional tree felling, including the use of rigging equipment
- methods for stump treatment or removal and the conditions and situations in which they can be applied cross cutting and snedding
- timber extraction systems and their suitability for different situations (e.g. slope, timber use)

- propping and bracing
- benefits and limitations of those operations to different trees in different environments
- techniques used to fell trees and their suitability for different trees, in different environments (e.g. residential, woodland) to meet different management objectives (e.g. timber length, firewood)
- how to apply techniques safely, to recognised standards and guidance, minimising risks to the operators and the environment.

Different forms of ground protection e.g. boards, brush mats

- how they are applied
- implications for route planning and tree operations.

Different purposes for felling trees in arboriculture and woodland management

- how the purpose affects the felling technique to be applied and associated operations e.g. ground protection.

Techniques for accessing trees for tree works (e.g. rope and harness and Mobile Elevated Work Platforms (MEWP)),

- suitability for different trees in different environments
- the equipment and materials required
- how they are applied when felling trees
- current industry good practice.

Techniques for aerial cutting of trees from a MEWP and using a rope and harness.

Different techniques for aerial tree rescue operations

- their suitability for different situations
- the equipment required
- how the techniques are applied.

The processing of tree and woodland work arisings e.g. wood chipping, stacking, sorting.

### **Woodland management considerations**

Factors to consider when carrying out felling activities to the UK Forestry Standard including

- timber and products
- the landscape
- cost
- access
- ownership
- woodland management plans
- the UK Forest Standard
- permissions required e.g. felling licences.

Different silviculture systems (e.g. coppice, clear fell, continuous cover)

- different forestry thinning regimes (e.g. pre-commercial, systematic, thinning)
- their benefits and limitations.

The concept of tree harvesting and techniques that can be used (including motor-manual, mechanical)

- their suitability for different species, environments and timber uses
- the equipment, techniques, machinery and materials required.

<p>Methods used to extract harvested trees</p> <ul style="list-style-type: none"><li>• their suitability for different species, environments and timber uses</li><li>• the equipment, machinery and materials required.</li></ul>	
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### Performance Outcome 3: Maintain trees and woodland to meet prescribed objectives

Students must demonstrate skills of reducing, reshaping and thinning of trees over 15m in height.

<b>Knowledge Specific to Performance Outcome</b>	<b>Skills</b>
<p><b>Health and safety</b></p> <p>Typical hazards and risks associated with undertaking maintenance of trees and woodlands e.g. uneven ground, chainsaw use, and control measures to be put in place to mitigate these risks.</p> <p><b>Business</b></p> <p>Similarities and differences in how arboriculture and forestry organisations obtain revenue</p> <ul style="list-style-type: none"> <li>• how arboriculture and forestry organisations maximise revenue generation opportunities</li> <li>• how tree and woodland maintenance contributes to revenue generation.</li> </ul> <p>Stakeholders in the supply chain (including land/tree owners, land agents, contractors, subcontractors, Forest Works Manager) and their role</p> <ul style="list-style-type: none"> <li>• the role of the marketplace in determining price and the factors that affect price</li> <li>• the relationship between price and management decisions (e.g. brashing, high pruning, pollarding).</li> </ul> <p>Factors that can affect profitable tree and woodland maintenance operations e.g. objectives, access,</p> <ul style="list-style-type: none"> <li>• options available to minimise negative factors during preparation,</li> </ul>	<p>Construct a climbing system.</p> <p>Climb a climbing system.</p> <p>Access trees using a rope and harness.</p> <p>Achieve work position in a tree.</p> <p>Redirect a climbing system.</p> <p>Descend a climbing system.</p> <p>Install a climbing line from ground level.</p> <p>Rescue an incapacitated person from a tree.</p> <p>Position a ladder for a safe climbing ascent.</p> <p>Ascend a ladder to safely access the crown of a tree.</p> <p>Position a MEWP.</p> <p>Operate a MEWP from the basket.</p> <p>Operate a MEWP from the ground level (e.g. rescue).</p> <p>Carry out tree maintenance using a rope and harness and a Mobile Elevated Work Platform (MEWP).</p> <p>Carry out aerial pruning including reducing, reshaping and thinning.</p> <p>Prune trees using the three-cut technique.</p>

<p>operation and post operation (tools, equipment, labour).</p> <p><b>Tools, equipment and machinery</b></p> <p>Types of tools (e.g. pole saws), equipment (e.g. climbing equipment,) and machinery (e.g. Mobile Elevated Work Platforms,) required for tree work, and woodland work-related operations</p> <ul style="list-style-type: none"> <li>• their characteristics</li> <li>• function</li> <li>• preparation requirements e.g. checks/inspections, adding materials, calibration</li> <li>• operation</li> <li>• suitability for carrying out tasks in different environments</li> <li>• maintenance and storage requirements to manufactures requirements.</li> </ul> <p><b>Tree biology, botany and health</b></p> <p>Characteristics of unhealthy or structurally weak trees (including dieback, bulges, slenderness, infection, infestation, cavities, broken branches, compression and tensile forks, fibre buckling, cracks, ribs, hazard beams)</p> <ul style="list-style-type: none"> <li>• causes of defects</li> <li>• implications for tree and woodland maintenance planning and operations.</li> <li>• suitability of different management options (e.g. reduction, thinning, aeration) to alleviate or improve condition.</li> </ul> <p>Characteristics of species causing decay in trees (e.g. <i>Meripilus giganteus</i>, <i>Inonotus hispidus</i>)</p>	<p>Support aerial tree workers using both Mobile Elevated Work Platform (MEWP) and rope and harness.</p> <p>Prune roots.</p> <p>Minimise / avoid damage to surrounding trees, other plants, animals and structures such as fences, paths and signs.</p> <p>Install bracing.</p> <p>Formatively prune trees from ground level.</p>
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- implications to tree and woodland maintenance.

### **Soils**

Techniques for manipulating (e.g. fertilisation, aeration, mulching) soils for tree growth

- the suitability of techniques for different soils, objectives, environments and tree species
- how they are applied in practice.

### **Timber and forest products**

Characteristics of wood including its structural elements and properties, cell types, cell structure

- environmental conditions that affect growth and development e.g. moisture, light.

Characteristics of defects in timber (e.g. knots, grain)

- their possible causes
- how this affects maintenance decisions and operations.

Factors affecting the quality of timber (including, environmental conditions) and how these are optimised through maintenance activities to maximise yield and quality.

How pruning (including brashing, high pruning, formative pruning) can help improve timber quality.

### **Preparing for tree and woodland maintenance operations**

The key roles and responsibilities of people on tree work and woodland sites (including operative, supervisor/team leader, client, visitor) and their contribution to tree and

woodland maintenance (including emergency tree work operations) and emergencies.

The principles of site management including

- logistics
- allocation of resources (time, labour, equipment, materials)
- decision-making and problem-solving responsibilities
- maintenance activities to be undertaken and their application in both arboriculture and woodland contexts.

Types of infrastructure that may be encountered when carrying out tree and woodland operations e.g. roads, power lines

- key requirements of related legislation
- implications for planning and completing maintenance operations.

Features of sites where tree and woodland operations take place including terrain, buildings, ground conditions, climate and microclimate, geology, hydrology, existing tree species, access, timing, habitats and their effect on

- the preparation for tree and woodland maintenance operations
- the types of operations that can be undertaken
- successfully meeting objectives.

Potential damage to the environment caused by tree and woodland maintenance operations

- causes of damage
- levels of damage acceptable

- how unacceptable levels can be prevented including techniques, materials and equipment to be used.

### **Information**

Reference sources of information for undertaking tree and woodland maintenance operations including British Standards (e.g. BS3998, BS8545), Industry Codes of Practice (ICoPs), AFAG/FISA Guidance (Arboriculture and Forestry Advisory Group/Forest Industry Safety Accord), manufacturers guidance.

- the information provided
- their status in relation to regulatory and legal requirements.

Types of information required for tree and woodland management and operations including work specifications, tree planting plans, different types of maps (including Ordnance Survey (OS), sketches,

- their content and format
- conventions and symbols
- how they are produced
- how they are used in planning and carrying out operations.

### **Tree work and felling operations**

Tree and woodland operations including:

- felling of small trees up to 380mm with hand tools and chainsaws
- cross cutting and snedding
- extraction of timber and arising
- managing the rooting environment of trees
- controlling unwanted root growth

- pruning including natural target pruning, formative pruning, crown thinning, crown lifting, crown reduction, branch reduction
- horticultural pruning
- propping and bracing
- benefits and limitations of those operations to different trees in different environments
- techniques used to carry out of tree and woodland operations and their suitability for different trees, in different environments to meet different management objectives
- how to apply techniques safely, to specified quality standards and guidance, minimising risks to the environment both undertaking and supporting each technique.

Different forms of ground protection e.g. boards, brush mats

- how they are applied when maintaining tree and woodland areas
- implications for route planning and tree operations.

Techniques for accessing trees for tree works (e.g. rope and harness and Mobile Elevated Work Platforms (MEWP)),

- suitability for different trees in different environments
- the equipment and materials required
- how they are applied when maintaining tree and woodland areas
- current industry good practice.

Techniques for aerial maintenance of trees from MEWP and using a rope and harness.

Different techniques for aerial tree rescue operations

- their suitability for different situations
- the equipment required
- how the techniques are applied.

The processing of tree and wood land work arisings e.g. wood chipping, stacking, sorting.

### **Woodland management and maintenance**

Factors to consider when maintaining woodland environments to the UK Forest Standard including

- timber and products
- the landscape
- cost
- access
- ownership
- woodland management plans
- works exempt from permissions.

Different silviculture systems (e.g. shelterwood, continuous cover)

- their use and implications for woodland maintenance operations how they are applied.

Features of woodland infrastructure (e.g. fences, drainage, footpaths, roads, archaeology)

- different types of each feature
- their suitability in different environments
- indications of infrastructure defects
- their maintenance requirements.

Different techniques for control of unwanted woodland vegetation (including manual, motor-manual or chemical)	
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- their suitability for different situations
- how they are applied.

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## Performance Outcome 4: Manage tree populations and woodlands to meet objectives

Students must demonstrate skills to manage at least two trees that require some form of management e.g. management of soil condition, pruning, felling, tree health care, replanting, reinspection, detailed assessment.

Knowledge Specific to Performance Outcome	Skills
<p><b>Health and safety</b></p> <p>Typical hazards and risks associated with undertaking surveys and site visits (e.g. permissions, lone working), and controls measures to be put in place to mitigate these risks.</p> <p><b>Environment</b></p> <p>Characteristics of ecosystems found in different landscapes (e.g. parks, woodland)</p> <ul style="list-style-type: none"> <li>• how ecosystems affect tree and woodland management decision making and objectives setting.</li> </ul> <p>The health, environmental and economic benefits and limitations of trees and green infrastructure in urban areas and woodland</p> <ul style="list-style-type: none"> <li>• how benefits are increased</li> <li>• how limitations are minimised</li> <li>• how benefits and limitations affect management decision making and objectives setting.</li> </ul> <p>The purpose of environmental risk assessments</p> <ul style="list-style-type: none"> <li>• the content of an environmental risk assessment</li> <li>• the relationship with other documents e.g. forestry management plan</li> </ul>	<p>Locate site boundaries from a map.</p> <p>Verify the accuracy of measuring equipment.</p> <p>Measure the volume of standing timber.</p> <p>Measure a stack of timber.</p> <p>Measure the diameter of timber at breast height (DBH).</p> <p>Measure the diameter of trees at 1.5m above ground level.</p> <p>Identify silvicultural system in use.</p> <p>Forecast timber yields.</p> <p>Assess tree health.</p> <p>Assess risks from trees.</p> <p>Take and preserve samples e.g. leaves, fungi, insects.</p> <p>Estimate tree age.</p> <p>Assess a tree against criteria for a Tree Preservation Order.</p> <p>Assess tree quality by the cascade chart.</p> <p>Determine minimum root protection areas.</p> <p>Draw a basic tree location plan digitally.</p> <p>Amend a basic tree location plan digitally.</p> <p>Create a Tree Constraints Plan.</p> <p>Value trees.</p> <p>Identify common tree and plant species.</p>

<ul style="list-style-type: none"> <li>• how environmental risk assessments are conducted</li> <li>• how site variables (e.g. terrain, proposed operations) affect decision making.</li> </ul> <p><b>Business</b></p> <p>Factors that can affect profitable tree and woodland operations (including organisation purpose and objectives, market prices and fluctuations, tree and woodland operations, waste, damage to the environment) and how this affects tree and woodland management decision making and objectives setting.</p> <p><b>Tree biology, botany and health</b></p> <p>The characteristics of health, unhealthy and structurally weak trees</p> <ul style="list-style-type: none"> <li>• how they relate to different parts of a tree and their interrelationships</li> <li>• characteristics of wood cells and their effects on tree growth and fungal decay</li> <li>• factors that affect growth (including tree root growth) and development</li> <li>• abiotic and human causes of ill health and damage to trees</li> <li>• implications on tree survival and immediate growing environment from dysfunction</li> <li>• typical pests and pathogens, their characteristics and methods of management and prevention</li> <li>• implications of tree health for the management of tree populations and woodlands.</li> </ul>	<p>Identify the presence of common pests / diseases / disorders.</p> <p>Input tree survey data into digital software.</p>
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Tests (including soil and foliar sampling) and associated technology (e.g. chlorophyll fluorimeter)

- samples to be taken and their purpose
- processes followed to take samples
- their use in tree and woodland management decision making and objectives setting.

### **Tree stocks and Tree Planting**

Principles and purpose of nomenclature and taxonomy systems

- position of trees and shrubs within the taxonomy of the wider kingdom
- characteristics and morphology of common tree and shrub families, genera, species and variety at differing life stages
- techniques (including botanical keys) and information sources (e.g. literature, digital technology) to aid correct identification
- the value of using and writing scientific names and implications for improper use
- types and use of tree tags and signs.

Factors that influence the choice of tree species (including biological, ecological and economic) for different environments (e.g. soils, urban, parkland, woodland) and to meet different management objectives (e.g. timber, amenity, shade, habitat).

Characteristics of different tree planting stock types (e.g. containerised, root ball, whips, plugs)

- the associated tree planting techniques
- the types of aftercare used
- associated guidance and standards e.g. BS8545
- their suitability for meeting different tree and woodland management objectives.

Characteristics of responsible sources for tree stocks and the economic, environmental and social importance of responsible tree sourcing.

### **Timber and forest products**

Factors affecting the quality of timber (including tree planting and establishment techniques, storage, handling) and how these affect management decisions for maximising yield and quality.

### **General surveying and management**

Features of sites where operations take place (e.g. woodland, urban) including terrain, buildings, ground conditions, climate and microclimate, geology, hydrology, existing tree species, access, timing, habitats and their effect on

- their effect on tree and woodland operations that can be undertaken
- the implications for tree and woodland decision making and achieving objectives.

Plans, sketches and mapping

- techniques for digitally creating and editing (including scaling, identifying specific trees and features).
- hand drawn styles and appropriate use

- their content and format
- conventions and symbols
- how they are used in planning, reporting and undertaking practical operations.

#### Tree measurement

- parts of tree measured
- methods (e.g. over bark, under bark)
- equipment required (e.g. tape measure, clinometer)
- basic mensuration units and terminology for forestry and non-forest trees (e.g. diameter, length, volume)
- information sources used (including yield tables, measurements, equations, calculations) and their suitability for different purposes (e.g. log volume)
- methods to determine stocking density.

#### Methods to estimate tree age (e.g. Mitchell, White)

- how they are applied
- their suitability for different purposes and locations.

#### **Managing woodlands**

Woodland maintenance operations (including brashing, high pruning, formative pruning) and thinning regimes used to meet management objectives and contribute to forest management plans

- the techniques and resources required (including time, labour, materials, equipment)
- time periods when best undertaken to meet management objectives e.g. improve timber quality.

#### Types of woodland (e.g. ancient, natural)

- their characteristics (trees, site, ecology, horizontal and vertical structure)
- their features (e.g. fences, drainage, footpaths, roads, archaeology)
- their benefits to silvicultural systems
- protections provided by law
- the relationship between characteristics, features, legal protections and silvicultural systems and management decision making and objective setting.

#### Woodland management plans

- typical content
- factors to consider in development (including timber and products, landscape, risk, cost, access, fire, ownership)
- relationship to UK Forest Standard
- their use in setting and reviewing management objectives, making management decisions and monitoring tree and woodland management activities.

#### Different silviculture systems (e.g. coppice, continuous cover)

- their characteristics

- their benefits and limitations to different environments
- benefits and limitations of artificial and natural regeneration for different systems
- factors (e.g. space, light, shade) that affect successful tree establishment and how these are used to support management decision-making
- different forestry thinning regimes (e.g. pre-commercial, systematic, thinning) and their benefits and limitations
- tree harvesting techniques and methods (including motor-manual, mechanical) and their suitability for different silviculture systems
- methods used to extract harvested trees and their suitability for different silviculture systems
- how systems are applied to create habitats, products and timber

Different techniques for control of unwanted woodland vegetation (including manual, motor-manual or chemical)

- their suitability for different situations
- how they affect management decision making and setting objectives.

Sampling methods (including systematic sampling, simple random sampling, stratified random sampling)

- the suitability of the sampling method to the management objectives

- the procedures and equipment required to apply the sampling methods.

### **Managing tree populations**

Benefits and limitations of single tree operations (e.g. felling, pruning) to different trees in different environments and how they support meeting management objectives (e.g. light, safety) see how it was previously.

The role and responsibilities of local planning authorities in relation to tree protection legislation including Conservation Areas, Tree Preservation Orders (TPO) and planning conditions:

- methods used for assessing the suitability for a Tree Preservation Order e.g. TEMPO, Helliwell
- tree inventory data required for the planning process
- associated guidance and standards (e.g. BS3998, BS5837)
- the purpose and content of Tree Constraint Plans, Arboriculture Impacts Assessments, Tree Protection Plans and the factors that lead to their implementation
- the relationship between planning conditions and developments constrained by trees and permitting work to a TPO tree.

### **Tree inspections**

- levels and types of surveys and inspections (e.g. formal, informal, detailed), their purposes, characteristics and guidance information

- inspection methodologies e.g. systematic, diagnostics
- data gathering e.g. field notes, tablets, survey programs
- qualitative and quantitative approaches to assessing risks from trees.
- risk mitigation options e.g. improving tree health, remove target, pruning
- reporting of findings e.g. detailed tree inspections, negative recording

Direct and indirect damage to surfaces and structures resulting from tree management activities

- implications of growing trees near infrastructure
- signs of direct and indirect tree root damage
- species associated with tree root damage
- mitigation measures e.g. root pruning, root barriers, removal
- preventative measures including utility pruning
- associated guidance and standards e.g. National Housebuilding Council (NHBC) standards
- role of the arboriculturist (e.g. not a structural surveyor).

Different tree valuation methods (including manual (e.g. Cavat, Heliwell) and digital (e.g. iTree)

- their purpose and focus

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| <ul style="list-style-type: none"><li>• information, data and resources required</li><li>• processes involved</li><li>• factors that affect valuation including market forces</li><li>• their suitability for different purposes and locations.</li></ul> |  |
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