# City & Guilds Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (1080) (0174-38)

**Version 2.5 (September 2023)**
(For delivery from September 2023)

## Qualification Handbook

ROYAL FORESTRY SOCIETY
INSPIRING PASSION AND EXCELLENCE IN WOODLAND MANAGEMENT

## Qualification at a glance

| | |
|---|---|
| **Industry area** | Horticulture and Forestry |
| **City & Guilds qualification number** | 0174-38 |
| **Age group** | 16-19 (Key Stage 5), 19+ |
| **Entry requirements** | Centres will ensure that any pre-requisites stated in the *What is this qualification about?* section are met. |
| **Assessment** | To gain this qualification, candidates will successfully achieve the following assessments:<br>• Two externally set, internally marked, externally moderated synoptic assignments<br>• Three externally set, externally marked exams, sat under examination conditions<br>• Portfolio of evidence<br>• One externally set, internally marked, externally verified assignment<br>• Optional unit assessments, externally set, internally marked, externally verified |
| **Additional requirements to gain this qualification** | Employer involvement in the delivery and/or assessment of this qualification is essential for all candidates and will be externally quality assured. |
| **Grading** | This qualification is graded.<br>For more information on grading, please see Section 7: Grading. |
| **Approvals** | These qualifications require full centre and qualification approval |
| **Support materials** | Sample assessments<br>Guidance for delivery<br>Guidance on use of marking grids |
| **Registration and certification** | Registration and certification of this qualification is through the Walled Garden, and is subject to end dates. |
| **External quality assurance** | This qualification is externally quality assured by City & Guilds, and its internally marked synoptic assignments are subject to external moderation. Additional internally assessed units / optional assessments are subject to external verification. There is no direct claim status available for this qualification. |

| Title and level | Size (GLH) | TQT | City & Guilds qualification number | Ofqual accreditation number |
|---|---|---|---|---|
| City & Guilds Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (1080) | 1080 | 1800 | 0174-38 | 601/7517/5 |

| Version and date | Change detail | Section |
|---|---|---|
| 1.1 May 2016 | Small typographical errors | Throughout |
| | TQT added for qualifications<br>Assessment component titles amended | 1. Introduction |
| | Employer involvement guidance updated throughout | 4. Employer involvement |
| | Summary of assessment methods and conditions | 5. Assessment |
| | Moderation and standardisation of assessment updated throughout | 6. Moderation and standardisation of assessment |
| | Awarding individual assessments<br>Awarding grades and reporting results | 7. Grading |
| | Enquiries about results<br>Re-sits and shelf-life of assessment results<br>Malpractice<br>Access arrangements and special consideration | 8. Administration |
| 1.2 June 2016 | Amendments to qualification structure for both pathways | 1. Introduction |
| | Amendments to assessment specifications | 5. Assessment |
| 1.3 January 2017 | Units 301 assessment method changed, weighting updated | 1. Introduction<br>5. Assessment<br>6. Moderation and standardisation of assessment |
| 1.4 June 2017 | Addition of the examination paper based module number | 1. Introduction – Assessment requirements and employer involvement<br>5. Assessment<br>5. Assessment – exam Specification<br>7. Grading – Awarding grades and reporting results |
| | Removal of AO 6-8 from synoptic Assignments and the readjusted approximate weightings | 5. Assessment – Assessment Objectives |
| | Revised Exam Specification, Exam duration and AO weightings | 5. Assessment – Exam Specification |
| | Addition of Provisional Grade Boundaries for the Synoptic Assignment | 7.Grading |
| | Branding Changes | City and Guilds Logo |
| 1.5 August 2017 | Removed QCF | Guidance for Delivery |

| Version and date | Change detail | Section |
|---|---|---|
| 2.0 August 2018 | Update to grading details | Section 7 Grading |
| 2.1 October 2018 | Addition of Royal Forestry Societies, “Certification in Forestry” (“RFS CertFor.”) | 1. Introduction - About this qualification |
| 2.2 November 2018 | Assessment method for unit 301 amended | 1. Introduction<br>5. Assessment |
| 2.3 May 2019 | Wording changed regarding retakes | 5. Assessment – Summary of assessment methods and conditions<br>8. Administration – Re-sits and shelf-life of assessment results |
| 2.4 May 2023 | Amended assessment method for unit 301<br>Component number for assessment component changed from 301 to 300 | 5 Assessment |
| | Clarified moderation and external verification processes | 5 Assessment<br>6 Moderation and standardisation of assessment |
| | Updated website links and references | 3 Delivering Technicals qualifications - Support materials<br>8 Administration |
| 2.5 September 2023 | Revision to the exam specification for the health and safety test component (300) | 5 Exam specification |

# Contents

# 1 Introduction

## What is this qualification about?

The following purpose is for the **City & Guilds Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (1080) 601/7517/5**

| Area | Description |
|---|---|
| OVERVIEW | |
| Who is this qualification for? | This qualification is for you if you are 16 years or older and want to work in the forestry or arboricultural industries. It is designed to provide you with a very wide range of specialist technical skills and detailed knowledge and understanding which will equip you to seek a diverse range of employment opportunities, or to further learning and training within the forestry and arboricultural industries.<br><br>On successful completion of the qualification, you will be awarded one of the following:<br><br>City & Guilds Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (Forestry) (1080)<br>or<br>City & Guilds Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (Arboriculture) (1080) |
| What does this qualification cover? | This qualification gives you the opportunity to learn about and build on the essentials of safe working with equipment and machinery, chainsaw use and planting and establishment of trees. You will be able to undertake a range of estate maintenance skills such as boundary maintenance and fencing. You will study soil and plant science, as well as tree science, plus you will learn about tree pests and diseases. You will then choose to specialise in either **forestry** or **arboriculture**.<br><br>If you wish to take the forestry option, then you will go on to study tree and shrub pruning, emergency tree work operations, measuring trees or woodland sampling, operating specialist machinery and forest and woodland skills. You could also study the principles of silviculture or how to maintain and operate equipment used for timber conversion and utilisation.<br><br>Students wishing to specialise in arboriculture will study areas such as how to support arboriculture operations from the ground and arboricultural skills (accessing the canopy, simple pruning at height and supporting tree climbing operations). You |

| | |
|---|---|
| | could also study advanced arboricultural practices such as aerial tree inspections and specialist canopy pruning. You could also learn about tree surveys and inspections, data analysis and legislation relating to trees in the UK.<br><br>Centres and providers work with local employers who will contribute to the knowledge and delivery of training. Employers will provide demonstrations and talks on the industry and where possible work placements will also be provided by the employers. This practically based training is ideal preparation for gaining employment in the forestry and arboricultural industries or specialist further study. |
| WHAT COULD THIS QUALIFICATION LEAD TO? | |
| Will the qualification lead to employment, and if so, in which job role and at what level? | This two-year qualification exposes you to the whole industry, and the opportunities within it. On completion, it is likely that you will enter the industry by working for an Arboricultural or Forestry company. As you will have gained a breadth and depth of skills and knowledge over a wide range of units, you could progress within work to become a:<br><br>**In the forestry pathway**<br>• Forestry contractor/operator<br>• Forest ranger<br>• Forest craftsman<br>• Forest supervisor<br><br>**In the arboriculture pathway**<br>• Tree worker (ground)<br>• Tree worker (aerial) |
| Why choose this qualification over similar qualifications? | City & Guilds offers two sizes of Level 3 qualification in Forestry & Arboriculture: Certificate and Extended Diploma (1080).<br><br>You would take the Extended Diploma (1080) if you want to specialise and develop the skills and knowledge required by employers in the forestry and arboricultural industries. The Extended Diploma (1080) is likely to be taken as a full-time programme of study over two years. By taking this large qualification, you will be exposed to, and have the opportunity to gain experience in, the wider tree work sector. This will enable you to progress to a diverse range of employment opportunities, as you will gain hands-on experience over 2 years, which is highly valued by employers.<br><br>The smaller Technical Certificate is typically delivered alongside other qualifications such as GCSEs, AS or A Levels. It provides an introduction to the core skills and knowledge required to enter employment in the forestry and arboricultural industries and opens first steps to a career in tree work. |

| | |
|---|---|
| Will the qualification lead to further learning? | You may wish to move onto an Advanced Apprenticeship in Trees and Timber, which allows you to combine working for a forestry contractor, in an arboretum, or a similar job, and typically attending one day a week at college or with a training provider.<br><br>You may wish to progress onto further learning within a Higher Education Institution.<br>You could go on to study subjects such as:<br>• Arboriculture Foundation Degree<br>• Forestry and Woodland Management Foundation Degree<br>• Woodland Conservation Management FdSc<br>• Woodland Conservation Management BSc (Hons) |

| WHO SUPPORTS THIS QUALIFICATION? | |
|---|---|
| Employer/Higher Education Institutions/Professional Membership Body | The Arboricultural Association<br>UPM Tillhill<br>Cornthwaite Forestry<br>Scottish Woodlands Ltd<br>TK Forestry<br>Husqvarna Group<br>J.A. Gadd Limited |

## Royal Forestry Society, “Certification in Forestry” (“RFS CertFor.”)

This Level 3 qualification is the standard theory component of the Royal Forestry Society’s “Certificate in Forestry” (“RFS CertFor.”).

The post nominal RFS Certification is designed to provide holders with industry recognition for their commitment to professional development in Forestry, demonstrating the holders ability to study both theoretical and practical competencies.

It also acts to provide employers a reassurance that a level of industry competence has been achieved.

This course, when combined with a suite of 8 industry accepted practical modules, qualifies the learner to apply for full RFS certification.

This is an industry accreditation that has been around for over a century. There is no time constraint on applying between achieving your theory and required practical modules.

To learn how to apply for RFS certification please follow this link :-
http://www.rfs.org.uk/learning/qualifications-post-nominal-awards/

**Please note that the successful completion of this City & Guilds qualification does not entitle the holder to use "RFS Cert Arb. or RFS Cert For." post nominally, until they have submitted both theory and practical evidence to the RFS for approval.**

## Qualification structure

For the **City & Guilds Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (Forestry)** the teaching programme will cover the content detailed in the structure below:

| Unit number | Unit title | GLH |
|---|---|---|
| **Mandatory** | | |
| 301 | Principles of Health and Safety | 30 |
| 302 | Undertake and review work related experience in the land based industries | 30 |
| 305 | Land based industry machinery operations | 60 |
| 307 | Plant and soil science | 60 |
| 309 | Undertake estate skills | 60 |
| 311 | Undertake a specialist project in the land based sector | 60 |
| 350 | Principles of tree felling and chainsaw use | 60 |
| 351 | Identification, planting, establishment and aftercare of plants for forestry and arboriculture | 60 |
| 352 | Principles and identification of pests, diseases and disorders of trees | 60 |
| 353 | Urban and community forestry projects | 60 |
| 354 | Woodland habitat management | 60 |
| 355 | Principles of tree science | 60 |
| **Optional – Learners will be taught at least 420 GLH from units 310, 356 – 361, 363 - 365** | | |
| 310 | Business management in the land based sector | 60 |
| 356 | Tree and shrub pruning and maintenance | 60 |
| 357 | Principles of silviculture | 60 |
| 358 | Emergency tree works | 60 |
| 359 | Operate, maintain and understand the principles of equipment used for timber processing and conversion | 60 |
| 360 | Measure trees and carry out woodland sampling | 60 |
| 361 | Operate, maintain and understand the principles of specialist forestry and arboriculture machinery | 60 |
| 363 | Forest and woodland skills | 60 |
| 364 | Principles of amenity or forestry establishment | 60 |
| 365 | Woodland management | 60 |

For the **City & Guilds Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (Arboriculture)** the teaching programme will cover the content detailed in the structure below:

| Unit number | Unit title | GLH |
|---|---|---|
| **Mandatory** | | |
| 301 | Principles of Health and Safety | 30 |
| 302 | Undertake and review work related experience in the land based industries | 30 |
| 305 | Land based industry machinery operations | 60 |
| 307 | Plant and soil science | 60 |
| 309 | Undertake estate skills | 60 |
| 311 | Undertake a specialist project in the land based sector | 60 |
| 350 | Principles of tree felling and chainsaw use | 60 |
| 351 | Identification, planting, establishment and aftercare of plants for forestry and arboriculture | 60 |
| 352 | Principles and identification of pests, diseases and disorders of trees | 60 |
| 353 | Urban and community forestry projects | 60 |
| 354 | Woodland habitat management | 60 |
| 355 | Principles of tree science | 60 |
| **Optional – Learners will be taught at least 420 GLH from units 310, 356, 358 – 359, 361 – 362, 364, 366 - 368** | | |
| 310 | Business management in the land based sector | 60 |
| 356 | Tree and shrub pruning and maintenance | 60 |
| 358 | Emergency tree works | 60 |
| 359 | Operate, maintain and understand the principles of equipment used for timber processing and conversion | 60 |
| 361 | Operate, maintain and understand the principles of specialist forestry and arboriculture machinery | 60 |
| 362 | Support arboriculture operations from the ground | 60 |
| 364 | Principles of amenity or forestry establishment | 60 |
| 366 | Advanced arboricultural practices | 60 |
| 367 | Arboricultural skills | 60 |
| 368 | Tree surveys and inspections | 60 |

## Total qualification time (TQT)

Total Qualification Time (TQT) is the total amount of time, in hours, expected to be spent by a Learner to achieve a qualification. It includes both guided learning hours (which are listed separately) and hours spent in preparation, study and assessment.

| Title and level | Size (GLH) | TQT |
|---|---|---|
| City & Guilds Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (1080) | 1080 | 1800 |

## Assessment requirements and employer involvement

To achieve the **City & Guilds Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (Forestry)** candidates will successfully complete **all** the mandatory assessment components **as well as** the optional assessment components for their chosen optional units.

| Component number | Title |
|---|---|
| **Mandatory** | |
| 011 | Level 3 Forestry and Arboriculture - Synoptic assignment (1)* |
| 012 or 512 | Level 3 Forestry and Arboriculture - Theory exam (1)* |
| 013 | Level 3 Forestry and Arboriculture - Synoptic assignment (2)* |
| 014 or 514 | Level 3 Forestry and Arboriculture - Theory exam (2)* |
| 300 | Level 3 Principles of health and safety – Theory exam (evolve online) |
| 302 | Level 3 Undertake and review work related experience in the land-based industries - Portfolio |
| 311 | Level 3 Undertake a specialist project in the land based sector - Assignment |
| **Optional** | |
| 310 | Level 3 Business management in the land based sector - Assignment |
| 356 | Level 3 Tree and shrub pruning and maintenance - Assignment |
| 357 | Level 3 Principles of silviculture - Assignment |
| 358 | Level 3 Emergency tree works - Assignment |
| 359 | Level 3 Operate, maintain and understand the principles of equipment used for timber processing and conversion - Assignment |
| 360 | Level 3 Measure trees and carry out woodland sampling - Assignment |
| 361 | Level 3 Operate, maintain and understand the principles of specialist forestry and arboricultural machinery - Assignment |
| 363 | Level 3 Forest and woodland skills - Assignment |
| 364 | Level 3 Principles of amenity or forestry establishment- Assignment |
| 365 | Level 3 Woodland management - Assignment |

To achieve the **Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (Arboriculture)** candidates will successfully complete **all** the mandatory assessment components **as well as** the optional assessment components for their chosen optional units.

| Component number | Title |
|---|---|
| **Mandatory** | |
| 011 | Level 3 Forestry and Arboriculture - Synoptic assignment (1)* |
| 012 or 512 | Level 3 Forestry and Arboriculture - Theory exam (1)* |
| 013 | Level 3 Forestry and Arboriculture - Synoptic assignment (2)* |
| 014 or 514 | Level 3 Forestry and Arboriculture - Theory exam (2)* |
| 300 | Level 3 Principles of health and safety – Theory exam (evolve online) |
| 302 | Level 3 Undertake and review work related experience in the land-based industries - Portfolio |
| 311 | Level 3 Undertake a specialist project in the land based sector - Assignment |
| **Optional** | |
| 310 | Level 3 Business management in the land based sector - Assignment |
| 356 | Level 3 Tree and shrub pruning and maintenance - Assignment |
| 358 | Level 3 Emergency tree works - Assignment |
| 359 | Level 3 Operate, maintain and understand the principles of equipment used for timber processing and conversion - Assignment |
| 361 | Level 3 Operate, maintain and understand the principles of specialist forestry and arboricultural machinery - Assignment |
| 362 | Level 3 Support arboriculture operations from the ground - Assignment |
| 364 | Level 3 Principles of amenity or forestry establishment- Assignment |
| 366 | Level 3 Advanced arboricultural practices - Assignment |
| 367 | Level 3 Arboricultural skills - Assignment |
| 368 | Level 3 Tree surveys and inspections - Assignment |

In addition, candidates **will** complete the mandatory employer involvement requirement for this qualification **before** they can be awarded a qualification grade. For more information, please see guidance in *Section 4: Employer involvement*.

## Employer involvement

| Component number | Title |
|---|---|
| **Mandatory** | |
| 838 | Employer involvement |

**Number of mandatory assessments per assessment type*

# 2 Centre requirements

## Approval

New centres will gain centre approval. Existing centres who wish to offer this qualification will go through City & Guilds' **full** Qualification Approval Process. There is no fast track approval for this qualification. Please refer to the City & Guilds website for further information on the approval process: **www.cityandguilds.com**

## Resource requirements

Centre staff should familiarise themselves with the structure, content and assessment requirements of the qualification before designing a course programme.

### Centre staffing

Staff delivering this qualification will be able to demonstrate that they meet the following requirements:

- be technically competent in the areas in which they are delivering
- be able to deliver across the breadth and depth of the content of the qualification being taught
- have recent relevant teaching and assessment experience in the specific area they will be teaching, or be working towards this
- demonstrate continuing CPD.

### Physical resources

Centres will be able to demonstrate that they have access to the equipment and technical resources required to deliver this qualification and its assessment.

### Internal Quality Assurance

Internal quality assurance is key to ensuring accuracy and consistency of tutors and markers. Internal Quality Assurers (IQAs) monitor the work of all tutors involved with a qualification to ensure they are applying standards consistently throughout assessment activities. IQAs will have, and maintain, an appropriate level of technical competence and be qualified to make both marking and quality assurance decisions through a teaching qualification or recent, relevant experience.

## Learner entry requirements

Centres will ensure that all learners have the opportunity to gain the qualification through appropriate study and training, and that any prerequisites stated in the *What is this qualification about?* section are met when registering on this qualification.

### Age restrictions

This qualification is approved for learners aged 16 – 19, 19+.

# 3 Delivering technical qualifications

## Initial assessment and induction

An initial assessment of each learner should be made before the start of their programme to identify:

- if the learner has any specific learning or training needs,
- support and guidance they may need when working towards their qualification,
- the appropriate type and level of qualification.

We recommend that centres provide an introduction so that learners fully understand the requirements of the qualification, their responsibilities as a learner, and the responsibilities of the centre. This information can be recorded on a learning contract.

## Employer involvement

Employer involvement is essential to maximise the value of each learner's experience. Centres are required to involve employers in the delivery of technical qualifications at Key Stage 5 and/or their assessment, for every learner. This will be in place or planned before delivery programmes begin in order to gain qualification approval. See *Section 4: Employer involvement* for more detail.

## Support materials

The following resources are available for this qualification:

| Description | How to access |
|---|---|
| Sample assessments | Available on the qualification pages on the **City & Guilds Website**: **www.cityandguilds.com** |
| Technical Qualifications: Guide to Teaching, Learning and Assessment | Available on the City and Guilds website:<br>**14-19-teaching-learning-assessment-guide-pdf.ashx (cityandguilds.com)** |
| Quality Assurance Guide for Centres: Technical Qualifications and the Extended Project Qualification (EPQ) | Available on the City and Guilds website:<br>**technicals-quality-assurance-guide-for-centres-pdf.ashx (cityandguilds.com)** |

# 4 Employer involvement

Employer involvement is a formal component of Key Stage 5 Technical qualifications. It does not contribute to the overall qualification grading, but is a mandatory requirement that all learners must meet. As such it is subject to external quality assurance by City & Guilds.

Department for Education (DfE) requirements state:

*Employer involvement in the delivery and/or assessment of technical qualifications provides a clear 'line of sight' to work, enriches learning, raises the credibility of the qualification in the eyes of employers, parents and students and furthers collaboration between the learning and skills sector and industry.*

*[Technical qualifications] will:*

- *require all students to undertake meaningful activity involving employers during their study; and*
- *be governed by quality assurance procedures run by the awarding organisation to confirm that education providers have secured employer involvement for every student.*

Extract from: ***Vocational qualifications for 16 to 19 year olds, 2017 and 2018 performance tables: technical guidance for awarding organisations, paragraphs 89-90***

City & Guilds will provide support, guidance and quality assurance of employer involvement.

## Qualification approval

To be approved to offer City & Guilds technicals, centres must provide an Employer Involvement planner and tracker showing how every learner will be able to experience meaningful employer involvement, and from where sufficient and suitable employer representatives are expected to be sourced.

Centres must include in their planner a sufficient range of activities throughout the learning programme that provide a range of employer interactions for learners. Centres must also plan contingencies for learners who may be absent for employer involvement activities, so that they are not disadvantaged.

As part of the approval process, City & Guilds will review this planner and tracker. Centres which cannot show sufficient commitment from employers and/or a credible planner and tracker will be given an action for improvement with a realistic timescale for completion. **Approval will not be given** if employer involvement cannot be assured either at the start of the qualification, or through an appropriate plan of action to address this requirement before the learner is certificated.

## Monitoring and reporting learner engagement

Employer involvement is a formal component of this qualification and is subject to quality assurance monitoring. Centres must record evidence that demonstrates that each learner has been involved in meaningful employer based activities against the mandatory content before claiming the employer involvement component for learners.

Centres must record the range and type of employer involvement each learner has experienced and submit confirmation that all learners have met the requirements to City & Guilds. If a centre cannot provide evidence that learners have met the requirements to achieve the component, then the learner will not be able to achieve the overall Technical Qualification.

## Types of involvement

Centres should note that to be eligible, employer involvement activities **will** relate to one or more elements of the mandatory content of this qualification. This does not mean that employer involvement in the optional units is not valuable, and centres are encouraged to consider this wherever appropriate.

As the aim of employer involvement is to enrich learning and to give learners a taste of the expectations of employers in the industry area they are studying, centres are encouraged to work creatively with local employers.

Employers can identify the areas of skills and knowledge in their particular industry that they would wish to see emphasised for learners who may apply to work with them in the future. Centres and employers can then establish the type of input, and which employer representative might be able to best support these aims.

To be of most benefit this will add to, rather than replace the centre's programme of learning.

Some examples of meaningful employer involvement are listed below. Employer involvement not related to the mandatory element of the qualification, although valuable in other ways, does not count towards this element of the qualification.

The DfE has provided the following examples of what does and does not count as meaningful employer involvement, as follows[1,2]:

***The following activities meet the requirement for meaningful employer involvement:***

- *students undertake structured work-experience or work-placements that develop skills and knowledge relevant to the qualification[3];*
- *students undertake project(s), exercises(s) and/or assessments/examination(s) set with input from industry practitioner(s);*
- *students take one or more units delivered or co-delivered by an industry practitioner(s). This could take the form of master classes or guest lectures;*
- *industry practitioners operate as 'expert witnesses' that contribute to the assessment of a student's work or practice, operating within a specified assessment framework. This may be a specific project(s), exercise(s) or examination(s), or all assessments for a qualification.*

*In all cases participating industry practitioners and employers must be relevant to the industry sector or occupation/occupational group to which the qualification relates.*

***The following activities, whilst valuable, do not meet the requirement for meaningful employer involvement:***

[1] As extracted from: Vocational qualifications for 16 to 19 year olds
2017 and 2018 performance tables: technical guidance for awarding organisations

[2]This list has been informed by a call for examples of good practice in employer involvement in the delivery and assessment of technical qualifications - **Employer involvement in the delivery and assessment of vocational qualifications**

[3] **DfE work experience guidance**

- *employers' or industry practitioners' input to the initial design and content of a qualification;*
- *employers hosting visits, providing premises, facilities or equipment;*
- *employers or industry practitioners providing talks or contributing to delivery on employability, general careers advice, CV writing, interview training etc;*
- *student attendance at career fairs, events or other networking opportunities;*
- *simulated or provider-based working environments eg hairdressing salons, florists, restaurants, travel agents, small manufacturing units, car servicing facilities;*
- *employers providing students with job references.*

### Types of evidence

For each employer involvement activity, centres are required to provide evidence of which learners undertook it, e.g. a candidate attendance register. The types of additional evidence required to support a claim for this component will vary depending on the nature of the involvement. Eg for a guest lecture it is expected that a synopsis of the lecture and register would be taken which each learner and the guest speaker will have signed; expert witnesses will be identified and will have signed the relevant assessment paperwork for each learner they have been involved in assessing; evidence of contribution from employers to the development of locally set or adapted assignments.

### Quality assurance process

As the employer involvement component is a requirement for achieving the KS5 Technical qualifications, it is subject to external quality assurance by City & Guilds at the approval stage and when centres wish to claim certification for learners.

Evidence will be validated by City & Guilds before learners can achieve the employer involvement component. Where employer involvement is not judged to be sufficient, certificates cannot be claimed for learners.

### Sufficiency of involvement for each learner

It is expected that the centre will plan a range of activities that provide sufficient opportunities for each learner to interact directly with a range of individuals employed in the related industry. Centres must also provide contingencies for learners who may be absent for part of their teaching, so they are not disadvantaged. Any absence that results in a learner missing arranged activities must be documented. Where learners are unable to undertake all employer involvement activities due to temporary illness, temporary injury or other indisposition, centres should contact City & Guilds for further guidance.

### Live involvement

Learners will gain most benefit from direct interaction with employers and/or their staff; however the use of technology (eg the use of live webinars) is encouraged to maximise the range of interactions. Where learners are able to interact in real time with employers, including through the use of technology, this will be classed as 'live involvement'.

It is considered good practice to record learning activities, where possible, to allow learners to revisit their experience and to provide a contingency for absent learners. This is not classed as live involvement however, and any involvement of this type for a learner will be identified as contingency.

### Timing

A learner who has not met the minimum requirements cannot be awarded the component, and will therefore not achieve the qualification. It is therefore important that centres give consideration to

scheduling employer involvement activities, and that enough time is allotted throughout delivery and assessment of the qualification to ensure that requirements are fully met.

# 5 Assessment

## Summary of assessment methods and conditions

| Component numbers | Assessment method | Description and conditions |
|---|---|---|
| 011<br>013 | Synoptic assignment | The synoptic assignments are **externally set, internally marked and externally moderated.** The assignments require candidates to identify and use effectively in an integrated way an appropriate selection of skills, techniques, concepts, theories, and knowledge from across the content area. Candidates will be judged against the assessment objectives.<br><br>Assignments will be released to centres as per dates indicated in the Assessment and Examination timetable published on our website.<br><br>Centres will be required to maintain the security of all live assessment materials. Assignments will be password protected and released to centres through a secure method.<br><br>There will be one opportunity within each academic year to sit the assignment. Candidates who fail the assignment will have one re-sit opportunity. The re-sit opportunity will be in the next academic year, and will be the assignment set for that academic year once released to centres. If the re-sit is failed, the candidate will fail the qualification.<br><br>Please note that for externally set assignments City & Guilds provides guidance and support to centres on the marking and moderation process. |
| 012 or 512<br>014 or 514 | Externally marked exam | The exams are **externally set and externally marked**, and will be taken either online through City & Guilds' computer-based testing platform (012/014) or as a paper-based test (512/514).<br><br>The exam is designed to assess the candidate's depth and breadth of understanding across content in the qualification at the end of the period of learning, using a range of question types and will be sat under invigilated examination conditions. See JCQ requirements for details: **http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations**<br><br>The exam specification shows the coverage of the exam across the qualification content. |

| Component numbers | Assessment method | Description and conditions |
|---|---|---|
| | | Candidates who fail the exam at the first sitting will have a maximum of two opportunities to retake.<br>If the candidate fails the exam three times then they will fail the qualification. (Note: the third and final retake opportunity applies to Level 3 only.)<br>For exam dates, please refer to the Assessment and Examination timetable. |
| 300 | Evolve online on-demand exam | This exam is **externally set and externally marked** and will be taken online through City & Guilds' computer-based testing platform under invigilated exam conditions. The exam is available on-demand and can be taken at any time in the year.<br><br>There is no maximum number of retake attempts for this exam , however, learners should be given sufficient time and tutor support before resitting. |
| 302 | Portfolio of evidence | This unit will be evidenced by a portfolio of evidence |
| 311 | Unit assignment | The unit assignments are **externally set, internally marked and externally verified.** The assignment requires candidates to identify and use effectively skills, knowledge and understanding from across the unit content area. Candidates will be judged against the unit grading criteria.<br><br>Arrangements for release, security and re-sitting assignments are the same as detailed for the synoptic assignment. |
| Optional units<br>310, 356, 357, 358, 359, 360, 361, 362, 363, 364, 365, 366, 367, 368 | Unit assignment | The unit assignments are **externally set, internally marked and externally verified.** The assignment requires candidates to identify and use effectively skills, knowledge and understanding from across the unit content area. Candidates will be judged against the unit grading criteria.<br><br>Arrangements for release, security and re-sitting assignments are the same as detailed for the synoptic assignment. |

## What is synoptic assessment?

Technical qualifications are based around the development of a toolkit of knowledge, understanding and skills that an individual needs in order to have the capability to work in a particular industry or occupational area. Individuals in all technical areas are expected to be able to apply their knowledge, understanding and skills in decision making to solve problems and achieve given outcomes independently and confidently.

City & Guilds technical qualifications require candidates to draw together their learning from across the qualification to solve problems or achieve specific outcomes by explicitly assessing this through the synoptic assignment component.

In this externally set, internally marked and externally moderated assessment the focus is on bringing together, selecting and applying learning from across the qualification rather than demonstrating achievement against units or subsets of the qualification content. The candidate will be given an appropriately levelled, substantial, occupationally relevant problem to solve or outcome to achieve. For example this might be in the form of a briefing from a client, leaving the candidate with the scope to select and carry out the processes required to achieve the client's wishes, as they would in the workplace.

Candidates will be marked against assessment objectives (AOs) such as their breadth and accuracy of knowledge, understanding of concepts, and the quality of their technical skills as well as their ability to use what they have learned in an integrated way to achieve a considered and high quality outcome.

## How the assignment is synoptic for this qualification

The typical assignment brief could be to re-landscape an area of wooded land. Learners would produce a report to assist in the planning and completion of the project. They would have to survey the site in detail and consider existing site constraints as well as planning for future management. The report would include information which can be used by operatives to complete any works required. Learners will be required to provide evidence of their involvement in a range of practical activities, eg planting woody plants, monitoring for pests and diseases, operating forestry and arboriculture machinery, climbing trees (if appropriate), felling and dismantling trees, removing waste.

## External exam for stretch, challenge and integration

The externally set, externally marked exams (012/512 and 014/514) will draw from across the mandatory content of the qualification, using a range of shorter questions to confirm breadth of knowledge and understanding. Extended response questions are included, giving candidates the opportunity to demonstrate higher level understanding and integration through discussion, analysis and evaluation, and ensuring the assessment can differentiate between 'just able' and higher achieving candidates.

## Optional unit assessments and integration into the synoptic qualification content

While the mandatory units for this qualification provide the main skills and knowledge required to work in Forestry and Arboriculture industry, the optional units provided give centres flexibility when devising programmes to meet local employment needs, where the purpose of the qualification demands this.

The assessments for the optional units will require that the candidate has experienced the full breadth of mandatory learning of the qualification in order to better demonstrate the rounded performance expected at higher grades.

Optional unit assessments are externally set, internally marked and externally verified.

## Assessment objectives

The assessments for this qualification are set against a set of assessment objectives (AOs) which are used across all City & Guilds Technicals to promote consistency among qualifications of a similar purpose. They are designed to allow judgement of the candidate to be made across a number of different categories of performance.

Each assessment for the qualification has been allocated a set number of marks against these AOs based on weightings recommended by stakeholders of the qualification. This mark allocation remains the same for all versions of the assessments, ensuring consistency across assessment versions and over time.

The following table understands all AOs in detail, including weightings for the synoptic assignments. In some cases, due to the nature of a qualification's content, it is not appropriate to award marks for some AOs. Where this is the case these have been marked as N/A. Weightings for exams (AOs 1, 2 and 4 only) can be found with the exam specification.

**011 - Level 3 Forestry and Arboriculture - Synoptic assignment (1)***

| Assessment objective | City & Guilds Level 3 Advanced Technical Certificate in Forestry and Arboriculture<br>Level 3 Forestry and Arboriculture - Synoptic assignment (1)*<br><br>Typical expected evidence of knowledge, understanding and skills | Approximate weighting (assignment) |
|---|---|---|
| **AO1** Recalls knowledge from across the breadth of the qualification. | Terminology, health, safety and risk assessment, legislation, land-based machinery use and maintenance, environmental impact, soil characteristics, pest and disease identification, felling methods for problem trees, plant structures and physiological processes, life cycle of plants, factors influencing plant growth and development, causes of ill health in trees, diagnosis, monitoring and management of ill health in trees, prevention and control of pathogens, control methods for pests and diseases. | 15% |
| **AO2** Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification. | Application of legislation and codes of practices, safety, importance of pre- and post-use machinery checks, minimising environmental impacts, impacts of soil properties on plant processes, plant structures, cultural maintenance, evaluation, ill health in trees and diagnosis, monitoring and management, consequences of pests, diseases and disorders for trees, host and pathogen relationships, importance of correctly identifying pathogens; consequences of misidentification of pathogens. | 30% |
| **AO3** Demonstrates technical skills from across the breadth of the qualification. | Planting, felling, cutting, soil testing, use of equipment and machinery, reporting on safety requirements, risk assessment, minimising environmental impacts, | 30% |

| | | |
|---|---|---|
| | stump and brush removal, dealing with problem trees. | |
| **AO4** Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes. | Applying and linking knowledge, understanding and practical skills to a particular situation, justifying decisions/ approaches taken, contingencies, reflection and evaluation. | 15% |
| **AO5** Demonstrates perseverance in achieving high standards and attention to detail while showing an understanding of wider impact of their actions. | Coherent charts, graphs, measurements, plant identification, correctly used botanical names, Care of equipment, time management, accuracy in practical tasks, routinely checking on quality, changing work practices in relation to external stimuli. | 10% |

**013 - Level 3 Forestry and Arboriculture - Synoptic assignment (2)***

| Assessment objective | City & Guilds Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (1080)<br>Level 3 Forestry and Arboriculture - Synoptic assignment (2)*<br><br>Typical expected evidence of knowledge, understanding and skills | Approximate weighting (assignment) |
|---|---|---|
| **AO1** Recalls knowledge from across the breadth of the qualification. | Stock types, support, protection and aftercare, tree and shrub identification, types of boundaries, structures and surfaces, materials and methods of construction, health and safety, habitat and woodland management techniques, historical development of woodland, woodland survey, equipment and resources for practical management of woodland habitats, urban tree management and community woodlands, decay and wound response to biotic and abiotic factors, tree biomechanics and structural assessment, principles of tree science. | 20% |
| **AO2** Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification. | Stock choice, planting methods, support, protection and aftercare of trees and shrubs, tools and materials for construction, repair and maintenance of boundaries, structures and surfaces, factors influencing the establishment of trees, use of conditioners and ameliorants in tree establishment, reasons for carrying out habitat management work, the historical development of woodland, survey techniques and woodland structures, sources of funding for urban and community projects, public influence of stakeholders, benefits to society of urban and community forestry, opportunities and | 25% |

| | | |
|---|---|---|
| | constraints to wider public engagement and participation, legal implications for public access and participation in urban and community forest projects, tree biomechanics and structural assessment, how trees respond to changes in environmental conditions, principles of tree science. | |
| **AO3** Demonstrates technical skills from across the breadth of the qualification. | Identifying, selecting, safely using and maintaining appropriate tools, equipment and resources, carrying out practical habitat management works, constructing, repairing or maintaining boundaries, structures and surfaces, planting, establishing and providing protection and aftercare for trees and shrubs, supporting trees and shrubs, carrying out surveys, measurements, recording field notes, producing a specification for community involvement. | 30% |
| **AO4** Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes. | Applying and linking knowledge, understanding and practical skills to a particular situation, justifying decisions/ approaches taken, contingencies, reflection and evaluation, coherence in written work. | 15% |
| **AO5** Demonstrates perseverance in achieving high standards and attention to detail while showing an understanding of wider impact of their actions. | Care of equipment, time management, accuracy in practical tasks, routinely checking on quality, changing work practices in relation to external stimuli. | 10% |

## Exam specifications

AO weightings per exam

| AO | Exam 012 or 512 weighting (approx. %) | Exam 014 or 514 weighting (approx. %) |
|---|---|---|
| AO1 Recalls knowledge from across the breadth of the qualification. | 30 | 30 |
| AO2 Demonstrates understanding of concepts, theories and processes from across the breadth of the qualification. | 50 | 50 |
| AO4 Applies knowledge, understanding and skills from across the breadth of the qualification in an integrated and holistic way to achieve specified purposes. | 20 | 20 |

The way the exams cover the content of the qualification is laid out in the table below:

**Assessment conditions**: Invigilated examination conditions

**Grading**: X/P/M/D

| 012/ 512 | Duration: 2 hours | | |
|---|---|---|---|
| **Unit** | **Unit title** | **Number of marks** | **%** |
| 307 | Plant and soil science | 15 | 25 |
| 350 | Principles of tree felling and chainsaw use | 13 | 22 |
| 352 | Principles and identification of pests, diseases and disorders of trees | 20 | 33 |
| N/A | Integration across the units | 12 | 20 |
| | **Total** | **60** | **100** |

**Assessment conditions**: Invigilated examination conditions
**Grading**: X/P/M/D

| 014 or 514 | Duration 2 hours | | |
|---|---|---|---|
| **Unit** | **Unit title** | **Number of marks** | **%** |
| 351 | Identification, planting, establishment and aftercare of plants for forestry and arboriculture | 16 | 27 |
| 354 | Woodland habitat management | 12 | 20 |
| 355 | Principles of tree science | 20 | 33 |
| N/A | Integration across the units | 12 | 20 |
| | **Total** | **60** | **100** |

**Assessment type**: Multiple-choice exam, delivered online *
**Assessment conditions**: Invigilated examination conditions
**Grading**: X/P

| Level 3 Principles of health and safety - Theory exam (300) | Duration: 1 hour | | |
|---|---|---|---|
| **Unit** | **Learning outcome** | **Number of marks** | **%** |
| Level 3 Principles of health and safety (301) | 1. Understand health and safety legislation | 9 | 30 |
| | 2. Understand the risk assessment process | 8 | 26 |
| | 3. Understand first aid requirements | 7 | 23 |
| | 4. Understand safe manual handling principles | 2 | 6 |
| | 5. Understand the use of fire extinguishers | 4 | 15 |
| | **Total** | **30** | **100** |

*These exams are sat under invigilated examination conditions, as defined by the JCQ: **http://www.jcq.org.uk/exams-office/ice---instructions-for-conducting-examinations**.

Entry for exams can be made through the City & Guilds Walled Garden.

# 6 Moderation and standardisation of assessment

City & Guilds' externally set synoptic assignments for technical qualifications are designed to draw from across the qualifications' content, and to contribute a significant proportion towards the learner's final qualification grade. They are subject to a rigorous external quality assurance process known as external moderation.

Moderation is the process where external quality assurers are standardised to a national standard in order to review centre marking of internally marked assessments. These external quality assurers are referred to as 'moderators'. Moderators will review a representative sample of 'candidate work' across the mark range from every centre. Their marks act as a benchmark to inform City & Guilds whether centre marking is in line with City & Guilds' standard.

Where moderation shows that the centre is applying the marking criteria within a reasonable range of mark tolerance, centre marks for the whole cohort will be accepted. Where moderation shows that the centre is either consistently too lenient or consistently too harsh in comparison to the national standard, an appropriate adjustment (up or down) will be made to the marks of the whole cohort, retaining the centre's rank ordering. Due to the nature of the assessment and the marking grid across Assessment Objectives (AOs), it is not expected that the tutors mark and the moderators mark will match exactly.

Where centre application of the marking criteria is inconsistent, an appropriate adjustment for the whole cohort may not be possible on the basis of the sample of candidate work. In these instances a complete remark of the candidate work may be necessary.

Additional unit and optional unit assessments are also subject to external quality assurance through a verification process. This involves external quality assurers scrutinising IQA records; sampling candidates' work across a range of units and also sampling across the mark/grade range. Centres are then provided with feedback and actions to ensure that results are valid and reliable.

For more detailed information, on the quality assurance process for synoptic assignments and additional unit and optional unit assessments please refer to 'Quality Assurance Guide for Centres: Technical Qualifications and the EPQ available to download on the City & Guilds website.

It is vital that centres familiarise themselves with this process, and how it impacts on their delivery plan within the academic year.

### Supervision and authentication of internally assessed work

The Head of Centre is responsible for ensuring that internally assessed work is conducted in accordance with City & Guilds' requirements.

City & Guilds requires both tutors and candidates to sign declarations of authenticity. If the tutor is unable to sign the authentication statement for a particular candidate, then the candidate's work cannot be accepted for assessment.

## Internal standardisation

For internally marked work the centre is required to conduct internal standardisation to ensure that all work at the centre has been marked and / or graded to the same standard. It is the Internal Quality Assurer's (IQA's) responsibility to ensure that standardisation has taken place, and that the training includes the use of reference and archive materials such as work from previous years as appropriate.

## Internal appeal

Centres must have an internal process in place for candidates to appeal the marking of internally marked components, ie the synoptic assignment and any optional unit assignments. This must take place before the submission of marks or grades for external quality assurance. The internal process must include candidates being informed of the marks (or grades) the centre has given for internally assessed components, as they will need these to make the decision about whether or not to appeal.

## Post-quality assurance procedures

Once the external quality assurance processes have been completed, feedback is provided to the centre on the standard of the internal assessment, highlighting areas of good practice, and potential areas for improvement. This will inform future centre assessment, and standardisation activities, as well as external quality assurance and risk management activity.

City & Guilds will then carry out awarding, the process by which grade boundaries are set with reference to the candidate evidence available on the platform.

## Centres retaining evidence

Centres must retain assessment records for each candidate for a minimum of three years. To help prevent plagiarism or unfair advantage in future versions, candidate work may not be returned to candidates. Samples may however be retained by the centre as examples for future standardisation of marking.

# 7 Grading

## Awarding individual assessments

Individual assessments will be graded, by City & Guilds, as pass/merit/distinction where relevant. The grade boundaries for pass and distinction for each assessment will be set through a process of professional judgement by technical experts. Merit will usually be set at the midpoint between pass and distinction. The grade descriptors for pass and distinction, and other relevant information (eg archived samples of candidate work and statistical evidence) will be used to determine the mark at which candidate performance in the assessment best aligns with the grade descriptor in the context of the qualification's purpose. Boundaries will be set for each version of each assessment to take into account relative difficulty.

Please note that as the merit grade will usually be set at the arithmetical midpoint between pass and distinction, there are no descriptors for the merit grade for the qualification overall.

## Grade descriptors

**To achieve a pass, a candidate will be able to**

- Demonstrate the knowledge and understanding required to work in the occupational area, its principles, practices and legislation.
- Describe some of the main factors impacting on the occupation to show good understanding of how work tasks are shaped by the broader social, environmental and business environment it operates within.
- Use the technical industry specific terminology used in the industry accurately.
- Demonstrate the application of relevant theory and understanding to solve non-routine problems.
- Interpret a brief for complex work related tasks, identifying the key aspects, and showing a secure understanding of the application of concepts to specific work related tasks.
- Carry out planning which shows an ability to identify and analyse the relevant information in the brief and use knowledge and understanding from across the qualification (including complex technical information) to interpret what a fit for purpose outcome would be and develop a plausible plan to achieve it.
- Achieve an outcome which successfully meets the key requirements of the brief.
- Identify and reflect on the most obvious measures of success for the task and evaluate how successful they have been in meeting the intentions of the plan.
- Work safely throughout, independently carrying out tasks and procedures, and having some confidence in attempting the more complex tasks.

**To achieve a distinction, a candidate will be able to**

- Demonstrate the excellent knowledge and understanding required to work to a high level in the occupational area, its principles, practices and legislation.
- Analyse the impact of different factors on the occupation to show deep understanding of how work tasks are shaped by the broader social, environmental, and business environment it operates within.
- Demonstrate the application of relevant theory and understanding to provide efficient and effective solutions to complex and non-routine problems.
- Analyse the brief in detail, showing confident understanding of concepts and themes from across the qualification content, bringing these together to develop a clear and stretching plan that would credibly achieve an outcome that is highly fit for purpose.

- Achieve an outcome which shows an attention to detail in its planning, development and completion, so that it completely meets or exceeds the expectations of the brief to a high standard.
- Carry out an evaluation in a systematic way, focussing on relevant quality points, identifying areas of development/ improvement as well as assessing the fitness for purpose of the outcome.

## Awarding grades and reporting results

The overall qualification grade will be calculated based on aggregation of the candidate's achievement in each of the assessments for the mandatory units, taking into account the assessments' weighting. The qualification will be reported on a ten grade scale: Pass Pass Pass, Pass Pass Merit, Pass Merit Merit, Merit Merit Merit, Merit Merit Distinction, Merit Distinction Distinction, Distinction Distinction Distinction, Distinction Distinction Distinction*, Distinction Distinction* Distinction*, Distinction* Distinction* Distinction*.

All assessments **must** be achieved at a minimum of pass for the qualification to be awarded. Candidates who fail to reach the minimum standard for grade pass for an assessment(s) will not have a qualification grade awarded and will not receive a qualification certificate.

The approximate pass grade boundaries for the synoptic assignments in this qualification are:

| Synoptic Assignment | Pass Mark (%) |
|---|---|
| 011 | 40% |
| 013 | 40% |

Please note that each synoptic assignment is subject to an awarding process before final grade boundaries are confirmed.

The contribution of assessments towards the overall qualification grade is as follows:

**Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (Forestry) (1080)**

| Assessment method | Grade scale | % contribution |
|---|---|---|
| Synoptic Assignment (011) | X/P/M/D | 30% |
| Exam (012/ 512) | X/P/M/D | 20% |
| Synoptic Assignment (013) | X/P/M/D | 30% |
| Exam (014/ 514) | X/P/M/D | 20% |

Both synoptic assignments and exams are awarded (see 'Awarding individual assessments', at the start of Section 7, above), and candidates' grades converted to points. The minimum points available for each assessment grade is listed in the table below. The range of points between the pass, merit and distinction boundaries will be accessible to candidates. For example a candidate that achieves a middle to high pass in an assessment will receive between 8 and 10 points, a candidate that achieves a

low to middle merit in an assessment will receive between 12 and 14 points. The points above the minimum for the grade for each assessment are calculated based on the candidate's score in that assessment.

| | Pass | Merit | Distinction |
|---|---|---|---|
| Assignment (011): 30% | 6 | 12 | 18 |
| Exam (012/512): 20% | 6 | 12 | 18 |
| Assignment (013): 30% | 6 | 12 | 18 |
| Exam (014/ 514): 20% | 6 | 12 | 18 |

The weighted average of candidate's points for each assessment is calculated, and the overall grade of the qualification will then be determined using the following criteria.

| Qualification Grade | Minimum points |
|---|---|
| Distinction*, Distinction*, Distinction* | 20.5 |
| Distinction, Distinction*, Distinction* | 19.3 |
| Distinction, Distinction, Distinction* | 18.2 |
| Distinction, Distinction, Distinction | 17 |
| Merit, Distinction, Distinction | 15 |
| Merit, Merit, Distinction | 13 |
| Merit, Merit, Merit | 11 |
| Pass, Merit, Merit | 9.3 |
| Pass, Pass, Merit | 7.7 |
| Pass, Pass, Pass | 6 |

Candidates achieving Distinction*, Distinction*, Distinction* will be the highest achieving of the Distinction candidates.

**City & Guilds Level 3 Advanced Technical Extended Diploma in Forestry and Arboriculture (Arboriculture) (1080)**

| Assessment method | Grade scale | % contribution |
|---|---|---|
| Synoptic Assignment (011) | X/P/M/D | 30% |
| Exam (012/512) | X/P/M/D | 20% |
| Synoptic Assignment (013) | X/P/M/D | 30% |
| Exam (014/514) | X/P/M/D | 20% |

Both synoptic assignments and exams are awarded (see 'Awarding individual assessments', at the start of Section 7, above), and candidates' grades converted to points. The minimum points available for each assessment grade is listed in the table below. The range of points between the pass, merit and distinction boundaries will be accessible to candidates. For example a candidate that achieves a middle to high pass in an assessment will receive between 8 and 10 points, a candidate that achieves a low to middle merit in an assessment will receive between 12 and 14 points. The points above the minimum for the grade for each assessment are calculated based on the candidate's score in that assessment.

| | Pass | Merit | Distinction |
|---|---|---|---|
| Assignment (011): 30% | 6 | 12 | 18 |
| Exam (012/512): 20% | 6 | 12 | 18 |
| Assignment (013): 30% | 6 | 12 | 18 |
| Exam (014/514): 20% | 6 | 12 | 18 |

The weighted average of candidate's points for each assessment is calculated, and the overall grade of the qualification will then be determined using the following criteria.

| Qualification Grade | Minimum points |
|---|---|
| Distinction*, Distinction*, Distinction* | 20.5 |
| Distinction, Distinction*, Distinction* | 19.3 |
| Distinction, Distinction, Distinction* | 18.2 |
| Distinction, Distinction, Distinction | 17 |
| Merit, Distinction, Distinction | 15 |
| Merit, Merit, Distinction | 13 |
| Merit, Merit, Merit | 11 |
| Pass, Merit, Merit | 9.3 |
| Pass, Pass, Merit | 7.7 |
| Pass, Pass, Pass | 6 |

Candidates achieving Distinction*, Distinction*, Distinction* will be the highest achieving of the Distinction candidates.

# 8 Administration

Approved centres will have effective quality assurance systems to ensure valid and reliable delivery and assessment of qualifications. Quality assurance includes initial centre registration by City & Guilds and the centre's own internal procedures for monitoring quality assurance procedures.

Consistent quality assurance requires City & Guilds and its associated centres to work together closely; our Quality Assurance Model encompasses both internal quality assurance (activities and processes undertaken within centres) and external quality assurance (activities and processes undertaken by City & Guilds).

For this qualification, standards and rigorous quality assurance are maintained by the use of:

- internal quality assurance
- City & Guilds external moderation (synoptic assessments)
- City & Guilds external verification (additional unit / optional assessments).

In order to carry out the quality assurance role, Internal Quality Assurers (IQAs) will have and maintain an appropriate level of technical competence and have recent relevant assessment experience. For more information on the requirements, refer to *Section 2: Centre requirements* in this handbook.

To meet the quality assurance criteria for this qualification, the centre will ensure that the following procedures are followed:

- suitable training of staff involved in the assessment of the qualification to ensure they understand the process of marking and standardisation
- completion by the person responsible for internal standardisation of the Centre Declaration Sheet to confirm that internal standardisation has taken place
- the completion by candidates and supervisors/tutors of the record form for each candidate's work.

## External quality assurance

City & Guilds will undertake external moderation and verification activities to ensure that the quality assurance criteria for this qualification are being met. Centres will ensure that they co-operate with City & Guilds staff and representatives when undertaking these activities.

City & Guilds requires the Head of Centre to

- facilitate any inspection of the centre which is undertaken on behalf of City & Guilds
- make arrangements to receive, check and keep assessment material secure at all times,
- maintain the security of City & Guilds confidential material from receipt to the time when it is no longer confidential and
- keep completed assignment work and examination scripts secure from the time they are collected from the candidates to their dispatch to City & Guilds.

## Enquiries about results

The services available for enquiries about results include a review of marking for exam results and review of moderation for synoptic assignments. Requests must be submitted within the specified period after the publication of results for individual assessments. Please see the **City & Guilds website** for more information.

## Re-sits and shelf-life of assessment results

Re-sits and shelf-life of assessment results Candidates who have failed an exam or wish to re-take it in an attempt to improve their grade, can do so **twice**. The best result will count towards the final qualification. See guidance on individual assessment types in Section 5.

## Factors affecting individual learners

If work is lost, City & Guilds should be notified immediately of the date of the loss, how it occurred, and who was responsible for the loss. Centres should use the JCQ form, JCQ/LCW, to inform City & Guilds Customer Services of the circumstances.

Learners who move from one centre to another during the course may require individual attention. Possible courses of action depend on the stage at which the move takes place. Centres should contact City & Guilds at the earliest possible stage for advice about appropriate arrangements in individual cases.

## Malpractice

Please refer to the City & Guilds guidance notes *Managing cases of suspected malpractice in examinations and assessments*. This document sets out the procedures to be followed in identifying and reporting malpractice by candidates and/or centre staff and the actions which City & Guilds may subsequently take. The document includes examples of candidate and centre malpractice and understands the responsibilities of centre staff to report actual or suspected malpractice. Centres can access this document on the City & Guilds website.

Examples of candidate malpractice are detailed below (please note that this is not an exhaustive list):

- falsification of assessment evidence or results documentation
- plagiarism of any nature
- collusion with others
- copying from another candidate (including the use of ICT to aid copying), or allowing work to be copied
- deliberate destruction of another's work
- false declaration of authenticity in relation to assessments
- impersonation.

These actions constitute malpractice, for which a penalty (eg disqualification from the assessment) will be applied.

Where suspected malpractice is identified by a centre after the candidate has signed the declaration of authentication, the Head of Centre must submit full details of the case to City & Guilds at the earliest opportunity. Please refer to the form in the document *Managing cases of suspected malpractice in examinations and assessments*.

## Access arrangements

Access arrangements are adjustments that allow candidates with disabilities, special educational needs and temporary injuries to access the assessment and demonstrate their skills and knowledge without changing the demands of the assessment. These arrangements must be made before assessment takes place.

It is the responsibility of the centre to ensure at the start of a programme of learning that candidates will be able to access the requirements of the qualification.

Please refer to the JCQ access arrangements and reasonable adjustments and Access arrangements - when and how applications need to be made to City & Guilds for more information. Both are available on the **City & Guilds website**.

## Special consideration

We can give special consideration to candidates who have had a temporary illness, injury or indisposition at the time of the examination. Where we do this, it is given after the examination.

Applications for either access arrangements or special consideration should be submitted to City & Guilds by the Examinations Officer at the centre. For more information please consult the current version of the JCQ document, A guide to the special consideration process. This document is available on the **City & Guilds website**

# Unit 301 Principles of Health and Safety

| | |
|---|---|
| **UAN:** | A/507/4634 |
| **Level:** | 3 |
| **GLH:** | 30 |

## What is this unit about?

This unit aims to provide learners with an understanding of the principles of health and safety and identify how these can be applied in practice within land-based or related industries. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Learners will be able to understand common health and safety practices and processes which they will encounter within the workplace. The land-based sector has one of the worst fatal accident records of any major industrial sector and a lack of basic training and/or competency is often a contributory factor. There is a need for new entrants to these industries to gain essential health and safety knowledge in order to minimise harm to themselves and to improve attitudes and behaviour in the workplace. In addition, the learners have the opportunity to consider factors which are specific to their workplace.

This unit must be taught alongside **all** technical units within the qualification ensuring learners gain an appreciation of its importance and so that they are equipped with knowledge and understanding to protect themselves and others when working in the industry.

## Learning outcomes

In this unit, learners will be able to

1. Understand health and safety legislation
2. Understand the risk assessment process
3. Understand first aid requirements
4. Understand safe manual handling principles
5. Understand the use of fire extinguishers

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand health and safety legislation**

### Topics

1.1 Impact of good and bad practice upon individuals and businesses
1.2 Key legislation relating to health, safety and welfare
1.3 Statutory duties of employers, employees and the self-employed
1.4 Consequences of not complying with statutory duties
1.5 How individuals can contribute to establishing a good health and safety culture

**Topic 1.1**

Learners will know direct and indirect consequences of poor standards of workplace health and safety practice on both businesses and individuals, to include:

**Financial eg:**

- prosecution fines and legal fees
- compensation claims
- repairs/replacement of equipment
- recruit and train new staff
- increased insurance premiums

**Emotional eg:**

- guilt and grief
- stress

**Reputation eg:**

- loss of reputation
- bad publicity

**Employees eg:**

- reduced staff morale and productivity
- increased staff turnover and sickness

**Social eg:**

- loss of independence
- reduced social activity

**Topic 1.2**

Learners will know key legislation relating to health, safety and welfare within the workplace, for example, Health and Safety at Work etc. Act 1974 and the Management of Health and Safety at Work Regulations 1999. Learners will understand the importance of accident and incident reporting in accordance with the Reporting of Injuries, Diseases and Dangerous Occurrences Regulations (RIDDOR) 2013. Learners will understand the legal status and practical implications of approved codes of practice and industry specific best practice guidance.

**Topic 1.3**

Learners will know the statutory duties of employers, employees and the self-employed, to include:

Employers

- provide a safe working environment
- provide safe equipment and systems of work.
- provide information, instruction, training and supervision.
- arrange for the safe storage, transport and use of articles and substances.
- provide adequate welfare facilities.

Employees

- take reasonable care of their own health and safety.
- take reasonable care of other people who may be affected by what they do or don't do at work.
- cooperate with their employer on health and safety.
- not interfere with or misuse anything provided for their health, safety or welfare

**Topic 1.4**

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 1.5**

Learners will understand how individuals 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
- 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

**2. Understand the risk assessment process**

## Topics

2.1 Principles of risk assessment

2.2 Workplace hazards

2.2 Risk assessment

Learning Outcome 2 provides learners with the knowledge on the requirements and importance of carrying out risk assessments. Learners will be expected to carry out risk assessments in practice when performing their industry specific activities as required.

**Topic 2.1**

Learners will understand the legal requirement to carry out suitable and sufficient risk assessments. They will understand the responsibilities of the employer, self-employed and employee within the risk assessment process and identify when expert advice and guidance may be required (e.g. lack of experience or knowledge).

**Topic 2.2**

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).

**Topic 2.3**

Learners will understand how to undertake a detailed risk assessment within the context of their workplace, following the Health and Safety Executive 'Five Steps to Risk Assessment', to include:

- identification of the hazards
- identification of who might be harmed and how they might be harmed
- evaluation of the risks and decide how the level of risk may be controlled
- recording and implementation of the results, as well as communication to others who may be affected
- reviewing risk assessments and suggesting when risk assessments should be reviewed

Learners will also know the hierarchy of risk control:

- elimination
- substitution
- safe working procedures
- training, instruction and supervision
- personal and respiratory protective equipment (PPE/RPE)

## Learning outcome

**3. Understand first aid requirements**

## Topics

3.1 Planning for emergencies and first aid provision in the workplace
3.2 Procedures when encountering an accident or medical emergency
3.3 First aid for common emergencies

In this outcome learners will explore the importance of planning to and subsequently how to manage common first aid emergencies which may arise in the workplace, with emphasis upon their workplace. Learners should be aware of the aims of first aid (i.e., preserve life, prevent injuries worsening and promote recovery) Evidence towards this outcome could come from a current first aid training qualification (i.e., appointed persons or first aid at work).

**Topic 3.1**

Learners will understand the importance of emergency planning, especially for lone or isolated working, and the responsibilities of a first aider. Learners will also know the minimum requirements for first aid at work and identify supplementary arrangements which may be appropriate for their workplace.

**Topic 3.2**

Learners will know the procedures to follow when encountering an accident or medical emergency. Learners will know how to check the incident site to minimize risk to themselves, assess the

situation, and how and when to contact the emergency services and identify prioritisation of activities (e.g., 'DRABC').

**Topic 3.3**

Learners will know how to manage the following common situations as well as other significant situations appropriate to their workplace:

- wounds and burns
- choking
- severe bleeding
- shock
- concussion
- unconscious casualties
- falls from height
- suspected broken limbs and dislocations
- heart attacks

Learners will know how to understand their own limitations and understand how to monitor the condition of the casualty and prevent an injury from worsening.

## Learning outcome

**4. Understand safe manual handling principles**

## Topics

4.1 Principles of safe manual handling

4.2 Safe manual handling of common items

In this outcome learners will investigate the principles of risk assessment relevant to manual handling in order to plan for and safely move a range of common items associated with their workplace. Learners should have access to a range of common mechanical aids and these should be used as appropriate.

**Topic 4.1**

Learners will understand how manual handling at work should be minimised and identify appropriate alternatives and mechanical aids. They will know the common causes of injuries associated with poor manual handling within the workplace.

**Topic 4.2**

Learners will understand how to safely move a range of common items within their workplace. They will know appropriate mechanical aids for a range of common manual handling activities within their workplace.

## Learning outcome

**5. Understand the use of fire extinguishers**

## Topics

5.1 Use of fire extinguishers

Learners will know the types, use and colours of portable fire extinguishers, to include:

- water
- dry powder
- foam
- CO2

Learners will know how to understand their own limitations in managing fires in the workplace.

## Guidance for delivery

On completion of this unit, the learner will have developed an understanding of some of the key underlying principles and practices of health and safety to help prepare them to enter the workplace. It will be important that delivery relates to example situations that are vocationally relevant to the learners.

Visiting speakers e.g. paramedics, health and safety consultants or inspectors could enhance the relevance of the subject to learners.

## Suggested learning resources

**Books**

Anon. 2013. *Farmwise - Your Essential Guide to Health and Safety in Agriculture*. Health and Safety Executive ISBN 0717665097

Chadder P. and Duncan M. 2014. *Health & Safety at Work Essentials. 8th Edition*. Lawpack Publishing Ltd. ISBN 1910143006

Stranks, J. 2010. *Health and Safety at Work: An Essential Guide for Managers. 9th Edition*. Kogan Page. ISBN 0749461195

**Websites**

| | |
|---|---|
| Health and Safety Executive (HSE) | http:// www.hse.gov.uk |
| The Royal Society for the Prevention of Accidents (ROSPA) | http://www.rospa.com/ |

# Unit 302 Undertake and review work related experience in the land based industries

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|---|---|
| **UAN:** | F/507/4635 |
| **Level:** | 3 |
| **GLH:** | 30 |

## What is this unit about?

The aim of this unit is to give learners the skills needed to identify, participate in and review work experience in the environmental and land based sector. The unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

## Learning outcomes

In this unit, learners will be able to

1. Determine employment opportunities in the environmental and land based industries
2. Prepare for a work-based experience in the environmental and land based industry
3. Understand the importance of effective interpersonal skills in the workplace
4. Review a work-based experience in the environmental and land based sector.

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Determine employment opportunities in the environmental and land based industries**

#### Topics

1.1 Career and progression opportunities within an environmental and land based industry

In this outcome, learners will explore the different job roles and responsibilities, and the job titles commonly associated with them in their specialist sector. This background understanding is likely to require some formal classroom teaching. Learners should be encouraged to explore the range of employment opportunities and career paths within their specialist sector. Learners will then consider the skills and qualifications that are required for appropriate jobs for themselves and should be encouraged to think about skills and qualifications that they may acquire to achieve their employment and careers ambitions. This should help them to identify suitable work experience.

**Topic 1.1**

Learners will know the job roles relevant to the land based sector, to include: managerial, supervisory, team worker, trainee, volunteer, common job titles within the relevant sector, main duties and responsibilities

Learners will also know the skills, qualifications and experience needed to fulfil duties and responsibilities of appropriate jobs, to include: job specific, vocational and personal

### Learning outcome

**2. Prepare for a work-based experience in the environmental and land based industry**

### Topics

2.1 Appropriate work-based experience and the application process

2.2 Interview skills

This outcome involves learners going through the process of applying for work experience. They will locate suitable job adverts or work experience opportunities, but can be supported by centres suggesting suitable placements. When applying for work experience learners should produce, as a minimum, a detailed curriculum vitae and letter of application using a computer. It will be beneficial for learners to attend a real or simulated interview, and reflect on their performance outlining how they could improve their effectiveness.

**Topic 2.1**

Learners will find a suitable job opportunity based on existing skills, experience, qualifications, development of skills and experience to achieve future employment goals. They will use a range of sources of information about work opportunities e.g. trade magazines, websites. Learners will complete an application form (if applicable), curriculum vitae and letter of application.

**Topic 2.2**

Learners will know how to prepare for an interview, eg:

Research the business and job role, suitable dress and personal presentation, information to find out and suitable questions to ask.

Learners will also know how to behave in an interview:
eg attend punctually and dressed appropriately, answering questions, completion of other tests (e.g. practical, aptitude), and reflection on interview performance

## Learning outcome

**3. Understand the importance of effective interpersonal skills in the workplace**

## Topics

3.1 The importance of effective interpersonal skills in the workplace

It would be appropriate for employers to be invited to outline to learners their expectations in the workplace.

**Topic 3.1**

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)
- courtesy and helpfulness
- appropriate dress and body language
- product knowledge
- use of technical terms

## Learning outcome

**4 Review a work- based experience in the environmental and land based sector**

## Topics

4.1 Present evidence of activities and achievements during a work-based experience
4.2 Review a work-based experience, identifying strengths and areas for improvement
4.3 Evaluate future career aspirations

In this outcome, learners will use evidence from their work experience to present a report (eg written or visual), on their work experience business, job role, learning and achievements. They will then review the effectiveness of the workplace, making realistic and justified suggestions for improvement. Review of their own workplace performance and achievements should include all of the content identified, with reference to relevant evidence, e.g. reports, progress reviews, and the extent to which their aims, objectives/targets have been achieved. Learners should consider further training and experience that will help them to achieve their career ambitions.

**Topic 4.1**

Learners will present evidence of activities and achievements during a work-based experience to include, as appropriate: name of work experience provider, nature of the organisation (type of business, products or services, customers), organisation structure chart, main duties and

responsibilities, regular daily working routine, evidence of safe working practices (eg PPE, risk assessments)

**Topic 4.2**

Learners will review their work-based experience, identifying strengths and areas for improvement, to include: work rate, work quality and effectiveness, punctuality, attendance, reliability, dress and personal presentation, working relationships with others work experience aims, objectives and targets

**Topic 4.3**

Learners will evaluate career aspirations, to include: advantages and disadvantages of identified pathways, suitability to personal interests, skills and qualifications,

## Guidance for delivery

Learners on vocational courses should have experience of the type of work that they hope to do, and of the expectations of potential future employers.
Ideally this unit should be undertaken in a real business environment relevant to the subject interest of the learner, but actual work experience may be gained by a number of routes, e.g. as part of an industrial placement whilst within the programme, whilst working on a planned daily or weekly basis on the centre's commercial and/or educational facilities, whilst undertaking voluntary work within the industry, as previous relevant and current work experience in the industry or as a member of a group of learners invited to carry out practical work on a suitable business.

Throughout the unit, the emphasis should be on safe working. It is expected that learners will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working.

Learners should complete a minimum of 150 hours of work experience to achieve this unit. If work experience is in the industry, centres should be mindful of their responsibilities for ensuring that work placements have appropriate supervision, insurance and health and safety policies in place.

It is recommended that a summary report is completed by the employer at the end of the work placement.

# Unit 305 Land based industry machinery operations

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|---|---|
| **UAN:** | J/507/4636 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

This unit aims to provide learners with an understanding of the principles of land based machinery operations and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learners will study the purpose and operation of land based machines including machine operating and working principles. They will explore routine maintenance and appropriate Personal Protective Equipment. They will also develop knowledge of the legal requirements and industry best practice guidance for land based machinery. They will learn how to safely operate and maintain machinery and consider the different conditions in which machinery might operate.

## Learning outcomes

In this unit, learners will be able to:

1. Understand the purpose and operation of land based industry machinery
2. Prepare land based industry machinery for work
3. Operate land based industry machinery

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1 Understand the purpose and operation of land based industry machinery**

#### Topics

1.1 Current legislation and industry guidance for land based industry machinery operation

1.2 Purpose and operation of land based machines

In Outcome 1 learners will understand the significance of current legislation and industry best practice guidance to the machinery they operate. Learners will also demonstrate understanding of the construction and working principles of a selection of machines commonly used in their specific land based industry, and knowledge of their work and performance parameters.

**Topic 1.1**

Learners will understand the significance of current legislation and industry best practice guidance to the machinery they operate. To include:

- legislation: eg Provision and Use of Work Equipment Regulations 1998 (PUWER), Health and Safety at Work Act 1974, Management of Health and Safety at Work Regulations 1999, Control of Substances Hazardous to Health Regulations 2002 (COSHH), Manual Handling Operations Regulations 1992, Personal Protective Equipment (PPE) at Work Regulations 1992, Environmental Protection Act 1990, Wildlife and Countryside Act 1981, Control of Noise at Work Regulations 2005, Control of Vibration at Work Regulations 2005, Lifting Operations and Lifting Equipment Regulations 1998
- industry best practice guidance

**Topic 1.2**

Learners will understand the purpose, operating and working principles and limitations of land based industry machinery. For example:

- purpose built, trailed, tractor mounted, self-propelled or pedestrian ,
- power source (eg electric, battery, spark ignition, compression ignition, PTO and hydraulic)
- drive and transmission systems
- cutting mechanisms
- cutting/loading capacity or range
- input and output ranges and levels
- terrain suitability
- safety features

## Learning outcome

**2. Prepare land based industry machinery for work**

## Topics

2.1 Machinery preparation
2.2 Carry out pre-use checks
2.3 Identify common faults and suggest appropriate remedial action
2.4 Check and report on safety requirements

In Outcome 2 learners will demonstrate the ability to prepare machines for work. Machines will be specific to learners' area of study. It is essential that manufacturers' recommendations, user's manuals and machinery handbooks are available to the learner. It is expected that leaners do this for three different machines.

**Topic 2.1**

Learners will prepare selected land based industry machinery for work in accordance with the manufacturers' recommendations, user's manual or machinery handbook.

**Topic 2.2**

Learners will carry out pre-use checks for selected land based industry machinery in accordance with the manufacturers' recommendations, user's manual or machinery handbook.

**Topic 2.3**

Learners will identify common faults and suggest appropriate remedial action to the machinery available to them. Common faults may include:

- incorrect, polluted or lack of fuel
- blocked filters (air, fuel, oils)
- poor oil pressure
- damaged sprockets and fouled drive systems
- damaged or blunt blades
- fouled or incorrectly set gap of spark plugs
- starter recoil tension
- blocked mechanisms

**Topic 2.2**

Learner will be able to check and report on the safety requirements for selected land based industry machinery in accordance with the manufacturers' recommendations, user's manual or machinery handbook.

## Learning outcome

**3. Operate land based industry machinery**

## Topics

3.1 Carry out risk assessments

3.2 Ways to minimise possible environmental impacts of using selected land based industry machinery

3.3 Operate land based industry machinery

3.4 Carry out post operating procedures

In outcome 3 learners will be required to operate land based industry machinery. It is anticipated that the delivery of this outcome will be through supervised practical training and the learners will be able to consolidate operational skills within realistic working environments. As a minimum, it is expected that the learner will be able to operate three powered machines appropriate to their area of study in a realistic industrial environment where possible. The learner should be given appropriate time in order to develop operational skills before assessment. The learner is not required to transport machinery, but should be aware of transport requirements.

**Topic 3.1**

Learners will carry out risk assessments for the machines they are to operate in accordance with The Management of Health and Safety at Work Regulations 1999

**Topic 3.2**

Learners will know how to minimise possible environmental impacts of land based industry machinery, eg:

- oil and fuel spillage and storage
- emissions
- soil stability and erosion
- protected species
- waste disposal
- watercourses

**Topic 3.3**

Learners will demonstrate safe and efficient operation of specialist land based industry machinery, to include as appropriate:

- risk assessment
- adherence to industry safety guidance and operator's manual,
- safe start and stop,
- monitoring of machine performance and output
- effective communications
- clearance of blockages,
- conversion between work and transport positions
- economic operation
- safe and efficient operation,

**Topic 3.4**

Learners will carry out post operating procedures appropriate to machinery operated. To include:

- cleaning

- inspecting for and reporting of damage or defects
- lubrication
- storage

## Guidance for delivery

This unit is designed to give learners knowledge, understanding and practical skills to enable them to understand and understand the working principles of land based industry machinery typically used in their area of study.

Learners will be able to demonstrate pre use checks and fault finding of a range of selected machines. They will be able to prepare machines for work and operate them safely and efficiently. An emphasis will be put on the use of manufacturers' recommended procedures, health and safety issues and safe working practices.

Learners will show awareness and consideration of hazards and risks at all times, particularly during operational situations where levels of risk may vary at any given time.

Where possible, tasks should be undertaken in a real working environment. Following operations, learners will demonstrate simple inspection and maintenance and pre storage tasks to minimise degeneration of the machine, and to ensure it is in a useable condition for subsequent operations.

## Suggested learning resources

**Books**


Arboricultural Association. 2005. *Arboricultural Association Health and Safety Package*. Cheltenham: Arboricultural Association. ISBN 0900978406.

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.

Kestel, B. 2009. *Chainsaw Operator's Manual: The Safe Use of Chainsaws.* Australia: Landlinks Press. ISBN 0643090282.

Southorn, N. 1999. *Tractor Operation and Maintenance*. Sydney: Inkata Press. ISBN 0750689145.

Williams, M. 2000. *Tractor Power.* Ipswich: Farming Press. ISBN 0852365144.

Bell B. 2005. *Farm Machinery*. Old Pond Publishing. ISBN 1903366682

Culpin C. 1992. *Farm Machinery,12th edition*. Blackwell Scientific. ISBN 063203159X

Manufacturers publications and manuals


**Journals and magazines**

Horticultural Weekly

Profi International

Farmers Weekly

Arboricultural Association newsletter

Forestry and British Timber

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Forest Industry Safety Accord (FISA) Safety Guides

**Websites**

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| www.bagma.com | British Agricultural and Garden Machinery Association |
| www.defra.gov.uk | Dept for Environment, Food and Rural Affairs |
| www.wales.gov.uk | Welsh Assembly Government |
| www.scotland.gov.uk | Scottish Executive Environment and Rural Affairs Department |
| www.dardni.gov.uk | Department of Agriculture and Rural Affairs (Northern Ireland) |
| www.hse.gov.uk | Health and Safety Executive |
| http:**//**www.trees.org.uk | The Arboricultural Association |
| http://www.ukfisa.com | The Forest Industry Safety Accord |
| http://www.gorestry.gov.uk | The Forestry Commission |
| http:/www.hse.gov.uk | The Health and Safety Executive |

# Unit 307 Plant and soil science

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| **UAN:** | L/507/4637 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

This unit aims to provide learners with an understanding of the principles of plant and soil science and how these can be applied in practice within land-based or related industries. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Learners will be able to develop an understanding of soil characteristics and their relationship to crop growth and development. They will investigate how plants grow and develop, through a knowledge of their structure and physiology. In addition, the learners have the opportunity to consider factors which influence production of commercial crops and other plants, which provides a basis for plant and soil management techniques.

## Learning outcomes

In this unit, learners will be able to

1. Understand the function of plant structures
2. Understand the main physiological processes and growth and development of plants
3. Understand how soils affect plant growth and development

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand the function of plant structures**

### Topics

1.1 Internal and external structures of plants

1.2 Function of plant structures

**Topic 1.1**

Learners will understand the major internal and external structures of plants:

- major internal structures: cell structure (cytoplasm, organelles), parenchyma, collenchyma, sclerenchyma, xylem tissue, phloem tissue, cambium, epidermis, guard cells, and stomata
- major external structures: roots, shoots, stem, leaves, buds, flowers, fruit and seeds
- specialised cells, tissues and organs: eg pericycle, endodermis, lenticels, cotyledons, stolons, rhizomes, bulbs, corms, root and stem tubers

**Topic 1.2**

Learners will understand the function of the major plant structures (e.g. photosynthesis, reproduction, support, transport, anchorage, absorption, storage, defence, attraction, gaseous exchange, respiration, division)

### Learning outcome

**2 Understand the main physiological processes and growth and development of plants**

### Topics

2.1 Processes of plant physiology

2.2 Life cycle of selected plants

2.3 Growth and development of plants

In this outcome learners will explore the major processes of plant physiology and identify factors affecting growth and development of plants. Learners will also need an awareness of how knowledge of plant physiology can be applied within land-based management scenarios.

**Topic 2.1**

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)

**Topic 2.2**

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 2.3**

Learners will understand the growth and development of plants, to include: cell division, cell expansion, cell differentiation, apical meristems, lateral meristems, formation of roots, shoots, leaves and buds

## Learning outcome

**3 Understand how soils affect plant growth and development**

## Topics

3.1 Soil types and soil formation
3.2 Investigate characteristics of soil types
3.3 How soils affect plant growth and development
3.4 Cultural techniques that affect soil characteristics

In this outcome learners will investigate a range of soil types and carry out supervised basic soil experiments to investigate different soil characteristics. These could include investigating the proportion of sand, silt and clay through suspending in water, investigating the water holding capacity of different soil types, and determining soil pH. The learners' understanding of the effects of soil characteristics on plant growth and development could be supported by some controlled experiments, where learners grow plants in different soil types.

Delivery could be enhanced by visits to see different types of plants growing in different soil types. Visiting expert speakers' input would be useful, as they would describe practical aspects of managing soil structure and plant nutrition.

**Topic 3.1**

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

**Topic 3.2**

Learners will 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.

**Topic 3.3**

Learners will 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

**Topic 3.4**

Learners will understand how cultural techniques affect soil structure, to include:

- Soil amelioration (eg green manure, addition of lime, organic matter, hydrogels, mycorrhizae, textural amendment)
- Soil cultivation (eg sub-soiling, ploughing, single and double digging, rotavating, minimal cultivation, zero cultivation)
- Soil protection and prevention of damage (eg capping, erosion, cultivation pans, surface and subsurface compaction

## Guidance for delivery

On completion of this unit, the learner will have developed an understanding of how plants grow and develop, through knowledge of their structure and physiology. It will be important that delivery relates to plants that are vocationally relevant to the learners. Laboratory and field based practicals will be essential to help learners to explore soil characteristics, plant physiology and structure, and a series of visits to growing plants could help learners better understand plant growth and development. Learners are required to study a range of plants for this unit, although they should be able to focus upon plant types that are most relevant to their vocational area of study. Learners will also have access to a range of soils, as well as appropriate equipment and resources to undertake soil sampling and investigate soil profiles.

Visiting speakers could enhance relevance of the subject to learners Development of areas within a college environment where learners are able to modify and manipulate plant environments may enhance understanding of the complexities of plants and their life cycles.

## Suggested learning resources

### Books


Adams C.R. and Early M. 2011. *Principles of Horticulture*. *6th Edition*. Routledge. ISBN 0080969577

Allaby, M. 2012. *A Dictionary of Plant Science. 3rd Edition*. OUP Oxford. ISBN 0199600570

Ashman M. and Puri, G. 2008. *Essential Soil Science: A clear and concise introduction to soil science.* Wiley-Blackwell ISBN 0632048859.

Beck C.B. 2010. *An Introduction to Plant Structure and Development: Plant Anatomy for the Twenty-First Century. 2nd Edition*. Cambridge University Press. ISBN 0521518059

Brady N.C. and Weil R.R. 2014. Nature and Properties of Soils. 14th Edition. Pearson Education. ISBN 9332519102.

Cutler D.F., Botha T. and Stevenson D.W. 2008. *Plant Anatomy: An Applied Approach.* John Wiley & Sons. ISBN 1405126795

Buchanan B.B., Gruissem W. and Jones, R. 2015. *Biochemistry and Molecular Biology of Plants. 2nd Edition.* Wiley-Blackwell. ISBN 0470714212

Evert R.F and Eichhorn S.E. 2012. Raven *Biology of Plants.* 8th Edition. WH Freeman & Co Ltd. ISBN 1464113513.

Lack, A. and Evans, D. 2005. *Instant Notes in Plant Biology.* 2nd Edition. Taylor and Francis. ISBN 0415356431

Mauseth, J.D. 2014. *Botany: An Introduction to Plant Biology. 5th Edition.* Jones & Bartlett Publishers. ISBN 1284068854

Reiss, M, Monger, G. 2000. *Advanced Biology.* Cheltenham: Nelson Thornes. ISBN 0174387326

Roberts, M. and Ingram N. 2001. *Biology*. *2nd Revised Edition* Nelson Thornes. ISBN 0748762388.

Smith A., Coupland G., Dolan L., Harberd N., Jones J., Martin C., Sablowski R. and Amey A. 2009. *Plant Biology*. Garland Science. ISBN 0815340257

Taiz, L., Zeiger, E. 2010. Plant Physiology. 5th Edition. Hampshire: Sinauer Associates. ISBN 0878935657

Wayne R. 2009. *Plant Cell Biology*. Academic Press. ISBN 0123747783

White R.E. 2005. *Principles and Practice of Soil Science: The Soil as a Natural Resource*. 4th Edition. Wiley-Blackwell. ISBN 0632064552.


### Journals and magazines

Arborist News

Essential Arb

Forestry Journal

Journal of Arboriculture

Quarterly Journal of Forestry

The Arb Magazine

Field mycology

### Websites

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| Biotechnology and Biological Sciences Research Council | http://www.bbsrc.ac.uk |
| British Society of Soil Science | http://www.soils.org.uk/ |
| DEFRA | http:// www.defra.gov.uk |
| Environment Agency | http:// www.environment-agency.gov.uk |
| Health and safety Executive | http:// www.hse.gov.uk |
| Science and Plants for Schools | http://www.saps.org.uk/ |
| The Arboricultural Association | http://www.trees.org.uk/ |
| The Forestry Commission | http://www.forestry.gov.uk |

# Unit 309 Undertake estate skills

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|---|---|
| **UAN:** | K/507/4645 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to introduce learners to common estate skills and knowledge and how these can be applied in practice. It is designed for learners in centre-based settings looking to progress into the sector or into further/higher education.

The learner will look at constructing, repairing and maintaining boundaries, structures and surfaces. They will build their experience and confidence in developing practical skills in a range of situations. The learner will be able to contextualise practical management work to a particular habitat that lies within their primary area of learning.

## Learning outcomes

In this unit, learners will be able to

1. Construct, repair or maintain boundaries
2. Construct, repair or maintain structures
3. Construct, repair or maintain surfaces
4. Carry out practical habitat management work

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Construct, repair or maintain boundaries**

### Topics

1.1 Types of boundaries
1.2 Prepare for work on boundaries
1.3 Select equipment and materials
1.4 Construct, repair or maintain boundaries

In this outcome learners will develop the practical skills needed to construct, repair or maintain at least **two** different boundaries.

**Topic 1.1**
Learners will know the types of boundaries, e.g.

- hedge, bank, ditch
- fence (post and rail, post and wire, electric, netting)
- wall (stone, brick).

**Topic 1.2**
Learners will plan the task, clear debris and prepare the site, ensure livestock and public safety, consider factors associated with the location (e.g. power supply, waste disposal, equipment and materials storage).

**Topic 1.3**
Learners will select materials and equipment relevant to the task, taking into account health and safety, sustainable practice and cost implications.

**Topic 1.4**
Learners will undertake the task safely (e.g. implementation of risk assessment and appropriate Personal Protective Equipment (PPE)) and to the required standards.

### Learning outcome

**2. Construct, repair or maintain structures**

### Topics

2.1 Types of structures
2.2 Prepare for work on structures
2.3 Select equipment and materials
2.4 Construct, repair or maintain structures

In this outcome, learners will construct, repair or maintain at least **two** different structures. These may typically be constructed from wood, metal, stone or brick. Learners are not expected to be able to fully construct substantial structures such as animal or machinery housing, however, it is

anticipated that delivery could include repair and maintenance of such larger structures as would be found in an estate setting. Large structures requiring repair or maintenance may include animal house or pen, machinery or feed store, garden furniture, shed and pergola.

**Topic 2.1**

Learners will know the different types of structures e.g. gate, stile, horse jump, bird box, table, bench, door, raised bed, composting area or swim platform, animal house or pen, machinery or feed store, garden furniture, shed and pergola.

**Topic 2.2**

Learners will plan the activity, clear debris and prepare the site, ensure livestock and public safety, consider location factors (power supply, waste disposal, equipment and materials storage).

**Topic 2.3**

Learners will select materials and equipment relevant to the task, taking into account health and safety, sustainable practice and cost implications

**Topic 2.4**

Learners will undertake the task safely (e.g. implementation of risk assessment and appropriate Personal Protective Equipment (PPE)) and to the required standards

## Learning outcome

**3. Construct, repair or maintain surfaces**

## Topics

3.1 Types of surfaces
3.2 Prepare for work on surfaces
3.3 Select equipment and materials
3.4 Construct, repair or maintain surfaces

In this outcome learners are required to construct, repair or maintain **one** surface (e.g. path, road and hard standing) which could be either solid (e.g. decking, concrete and paving), or loose (e.g. gravel, wood chippings and sand). Where appropriate, learners should be aware of timeliness considerations, for example preparing concrete at the right time for construction.

**Topic 3.1**

Learners will know different types of surfaces, eg:

- solid (e.g. decking, concrete and paving)
- loose (e.g. gravel, wood chippings and sand).

**Topic 3.2**

Learners will plan the task, clear debris and prepare the site, ensure livestock and public safety, consider factors associated with the location (e.g. power supply, waste disposal, equipment and materials storage).

**Topic 3.3**

Learners will identify and select materials and equipment relevant to the task, taking into account health and safety, sustainable practice and cost implications.

**Topic 3.4**

Learners will undertake the task safely (e.g. implementation of risk assessment and appropriate Personal Protective Equipment (PPE)) and to the required standards.

## Learning outcome

**4. Carry out practical habitat management work**

## Topics

4.1 Habitat management activities

4.2 Prepare for habitat management work

4.3 Select equipment and materials

4.4 Carry out practical habitat management work

In this outcome learners should be aware of time considerations for practical habitat management work, for example preparing concrete at the right time for construction.

**Topic 4.1**

Learners will know different types of activities required for habitat management, eg:

mowing, renovation, tree and shrub planting, clearing unwanted vegetation, coppicing, pruning, thinning, pond, stream and ditch clearance, and control of invasive species.

**Topic 4.2**

Learners will plan the task, clear debris and prepare the site, ensure livestock and public safety, consider factors associated with the location (e.g. power supply, waste disposal, equipment and materials storage)

**Topic 4.3**

Learners will identify and select materials and equipment relevant to the task, taking into account health and safety, sustainable practice and cost implications

**Topic 4.4**

Learners will undertake the task safely (e.g. implementation of risk assessment and appropriate Personal Protective Equipment (PPE)) and to the required standards.

# Guidance for delivery

This unit has a very practical focus, and aims to enable learners to develop estate skills which can be applied to a range of situations and circumstances. The unit has been written such that naturally occurring and locally relevant opportunities can be used in selecting sites, structures and surfaces to construct, repair or maintain.

As learners will be engaged in practical activity there should be an emphasis on safe working practices, including the use of appropriate personal protective equipment (PPE), and appropriate risk assessments should be undertaken. At Level 3 it is expected that learners will take an active part in completing risk assessments, so that this becomes an integral part of all practical activity. Learners should also be made aware of the impact on the environment, and sustainability concepts should also be demonstrated where possible.

Learners should have the opportunity to undertake estate skills activity in a land-based setting wherever possible to maximise the vocational relevance. It will be most beneficial if the structures, boundaries and surface selected are for a clear purpose above and beyond delivery of this unit. It is understand that there will not be opportunities to carry out construction, repair *and* maintenance in each of the categories, but it would be appropriate for the skills of construction, repair and maintenance to each be developed in one aspect of the unit.

It is anticipated that most delivery of this unit will take place in a practical setting, with supervised practice of skills. Delivery will also include some classroom based activity in ensuring learners have a good understanding of planning, materials selection and preparation, and underpinning knowledge.

## Suggested learning resources

**Books**


Agate E (Ed), Brooks A and Adcock S (1999) *Dry Stone Walling: A Practical Handbook*. The Conservation Volunteers.

Agate E (2001) *Fencing: A Practical Handbook*. The Conservation Volunteers.

Agate E (2001) *Footpaths: A Practical Handbook*. The Conservation Volunteers.

Agate E and Brooks A (1998) *Hedging: A Practical Handbook*. The Conservation Volunteers.

Agate E (Ed) (2001) *Tree Planting and Aftercare: A Practical Handbook*. The Conservation Volunteers.

Agate E (2000) *Tool Care: A Maintenance and Workshop Manual*. The Conservation Volunteers.

Agate E (2001) *Waterways &Wetlands: A Practical Handbook*. The Conservation Volunteers.

Agate E (Ed) (2002) *Woodlands: A Practical Handbook*. The Conservation Volunteers.

Maclean M (2006) *Hedges and Hedgelaying – A Guide to Planting, Management and Conservation*. The Crowood Press.

Roberts, M. (1997) *Poultry House Construction*. Gold Cockerel Books

Roberts, M. (1999) *The Smallholder's DIY*. Gold Cockerel Books

Roberts, M. (2005*) Farm and Smallholder Fencing: A Practical Guide to Permanent and Electric Livestock Fencing on the Farm and Smallholding*. Gold Cockerel Books

Stokes A (1999) *Health and Safety Overview for Practical Conservation Project: A Guide to Good Practice for Conservation Groups and Land Managers*. The Conservation Volunteers.


**Websites**

| | |
|---|---|
| The Conservation Volunteers | www.tcv.org.uk |
| Department for Environment, Food and Rural Affairs | www.defra.gov.uk |
| Health and Safety Executive | www.hse.gov.uk |
| The Wildlife Trusts | www.wildlifetrusts.org |
| Forestry Commission | www.forestry.gov.uk |

# Unit 310 Business management in the land based sector

| | |
|---|---|
| **UAN:** | A/507/4648 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is for learners look at the businesses within the land based sector, the role and responsibilities of those employed in land-based businesses and resource requirements.

This unit links closely to **Unit 302: Undertake and review work related experience in the Land-based Industries**

## Learning outcomes

In this unit, learners will be able to

1. Understand the breadth and importance of an industry in the land-based sector
2. Understand business resources and structures
3. Understand the business marketplace
4. Understand how to use financial and physical record keeping systems

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand the breadth and importance of an industry in the land-based sector**

### Topics

1.1 Importance to the economy

1.2 Associated businesses

In this outcome, learners will investigate the size, scope and importance of their specialist sector within the environment and land-based industries, and how this has developed over the last 50 years or so. They will also investigate the range of business types and other organisations that are represented in their sector, including important regulatory, professional or representative organisations. Wherever possible this should be related to specific businesses and organisations.

**Topic 1.1**

Learners will understand the importance of businesses within the industry to the economy

- using measures available to the industry, including
  - value of output
  - contribution to Gross Domestic Product (GDP)
  - employment
  - land use
  - economic and social benefits
  - trends in importance
- range of organisations:
  - typical types of businesses and other organisations (eg representative, regulatory, not-for-profit)
  - regional variations
  - changes and developments in the last 50 years

**Topic 1.2**

Learners will understand the range of associated businesses allied to the industry, to include

- relevant industries in primary, secondary and tertiary industrial sectors (eg suppliers of raw materials, processors, distributors, retailers, service providers)
- associated organisations:
  - specific interrelationships between one business and other associated organisations eg
    - suppliers of goods and services
    - representative organisations and professional bodies
    - regulatory bodies
    - competitors
    - customers
    - aims and roles of important organisations in the sector

## Learning outcome

**2. Understand business resources and structures**

## Topics

2.1 Legal structure and organisation

2.2 Physical resource requirements

2.3 Job roles and responsibilities

This outcome focuses on the legal and resource implications of constituting a business. Learners will learn about the range of business organisations in the private and public sectors, and the legal and practical implications of different business types. This should be related to the types of business important in their sector. Learners will investigate the physical resource requirements of businesses, and how they are managed.

**Topic 2.1**

Learners will understand the legal structure and organisation for the following business types:

- sole trader
- partnership
- limited company
- not-for-profit organization
- charity
- public sector organisations
- organisation staffing structure

**Topic 2.2**

Learners will understand the physical resource requirements of a selected land-based business, to include:

- property ie forms of tenure, appraisal of business potential
- vehicles and machinery
- tools and equipment
- materials ie stocks control procedures
- insurance of physical resources

**Topic 2.3**

Learners will understand different job roles and responsibilities in a selected land-based business.

- Job roles relevant to the sector, including
  - director
  - manager
  - supervisor
  - team worker
  - trainee
  - administrator
  - volunteer
  - sub contractor
- For each of the above job roles, learners will explore:
  - job description (eg responsibilities for financial physical and human resources, staff motivation and performance management)
  - person specification (typical skills, qualifications and experience required to fulfil the role)

- legal rights and responsibilities in work (eg pay, working hours, holidays, equal opportunities, health and safety, employment protection)

Learners will know relevant employment legislation, including

- Employment Act 2002
- National minimum wage Act 1998
- Working times regulation Act 1998
- Equality Act 2010

## Learning outcome

**3. Understand the business marketplace**

## Topics

3.1 Marketplace, customers and competitors

3.2 Supply chain

3.3 Quality management

In this outcome, learners will analyse the market for a specific land-based business. This could involve a case study project and should identify, for that business, information on the content listed. External influences should be relevant and current to that business. Specific competitors should be identified and analysed to identify strengths and weaknesses to the case study business. When investigating the supply chain learners will identify the flow of resources from production of raw materials, through relevant manufacture and processing, to end consumers. Quality management will include reference to any formal standards or approvals that are relevant. It should also consider the quality standards required by the industry, any systems and practices that are used to achieve quality, and implications of failing to meet prescribed or assumed levels of quality.

**Topic 3.1**

Learners will understand the marketplace, customers and competitors for a land-based business by investigating the following:

- size of market ie value of sales, number of customers
- external influences on the market ie political, economic, socio-cultural, technological
- customer base ie number, type, characteristics, market segments
- competitor analysis ie direct and indirect competitors

**Topic 3.2**

Learners will understand the importance of efficiency and interdependency in a supply chain in a land-based context, considering the following:

- suppliers
- distributors
- customers
- supply chain assurance
- ethics

**Topic 3.3**

Learners will understand quality management systems and practices within a land-based business

- important aspects of quality in the sector

- formal quality standards or approval eg BALI approved, Plant Passports, British Standards
- informal systems and practices to achieve quality
- problems arising if quality is not achieved

## Learning outcome

**4. Understand how to use financial and physical record keeping systems**

## Topics

4.1 Financial records

4.2 Physical records

4.3 Monitor business performance and progress

This outcome focuses on the range of financial and physical records that are required to meet legal requirements as well as to ensure effective business operation. Learners will complete a range of financial records. They should be aware of paper-based and computerised systems for financial records but are not expected to become competent in the use of IT accounts software. The range of physical records investigated should be related to the needs of the learners' specialist sector, and should include important current examples of legally required records. In addition to completing a range of records, learners will investigate how specific examples can be used to aid decision making, monitor and control business performance.

**Topic 4.1**

Learners will understand the importance of keeping accurate financial records for a selected land-based business in relation to legal requirements and management efficiency. Learners will understand the following financial records:

- purchasing and ordering procedures
- order forms and orders
- deliveries and receipts
- invoices and sales records
- credit control
- payment methods
- bookkeeping ie cash analysis, petty cash, cash flow, budgets, computer accounts programmes
- basic accounts ie trading account, balance sheet, depreciation
- taxation ie VAT, income tax PAYE, national insurance contributions, corporation tax
- wage calculation.

**Topic 4.2**

Learners will understand the importance of recoding physical records for a selected land-based business, to include

- production
- inputs
- staffing
- customers
- resource use
- data protection
- legal requirements to keep records eg pesticide use, veterinary medicines, transport, animal movement, passports

**Topic 4.3:**

Learners will understand how financial and physical records are used in monitoring business performance and progress to include

- production levels
- costs of production
- financial efficiency
- monitoring against targets
- budgets
- previous periods
- relevant review periods ie weekly, monthly, annually
- appropriate remedial actions
- staff roles in recording and analysing information.

## Guidance for delivery

This unit is designed to provide the learner with an understanding of the business aspects of their industry. It is applicable to all sectors of the environment and land-based sector and learners focus their study on the sector most relevant to their vocational interests.

Centres are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of establishments to add depth to the learner experience.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are they are linked directly with interactive lessons in a real environment.

# Unit 311 Undertake a specialist project in the land based sector

| | |
|---|---|
| **UAN:** | D/507/4643 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is for learners to gain an understanding of the principles of undertaking a specialist project and how this can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Learners will develop project knowledge and skills by studying a chosen topic area through a project. They will explore topic areas that interest them and select one topic for their project. They will plan and carry out their specialist project working to meet deadlines and monitoring performance. Learners will prepare an evaluative report looking at how the project performed, if the schedule plan met the project aims and objectives and how improvements could be made in the future.

## Learning outcomes

In this unit, learners will be able to

1. Develop proposals for specialist projects
2. Plan for specialist projects
3. Carry out specialist projects
4. Evaluate specialist projects

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Develop proposals for specialist projects**

### Topics

1.1 Research topics for specialist sources using information sources

1.2 Project proposal

In this outcome, learners will identify a suitable topic for their investigative project. This should be relevant to their programme of study and have a particular interest for them, for example in relation to a special area of interest, experience or future employment of study ambitions. Ideal project topics could have a practical or theoretical focus, but all projects should include potential for research into existing literature and information sources as well as a practical investigation or application, so should be chosen in agreement with the tutor. Learners are likely to need guidance on suitable project topics and tutor support to ensure that selected topics are achievable in the timescale and with the resources available. The proposal should outline the aims and objectives, information sources, resource requirements, and the methodology by which the learner intends to complete the project, as well as their justification for topic selection. If appropriate to the investigation, a hypothesis should be included as part of the methodology.

**Topic 1.1**

Learners will use a range of information sources to research topics for specialist project, including:

- textbooks
- journals
- magazines
- internet
- trade literature
- television and radio
- subject experts

Learners will comment on the validity and reliability of each type of information source.

Learners will carry out research using methods appropriate to the topic, for example

- literature review
- trials, experiments
- practical activities
- questionnaires
- interviews
- surveys.

**Topic 1.2**

Learners will produce proposals for specialist projects to include

- title
- aims/objectives
- methodology
- information sources
- resources required for completion of the project ie advice and support, computers, materials

- justification of proposed project.

## Learning outcome

**2. Plan for specialist projects**

## Topics

2.1 Planning operations and resources

2.2 Selection of resources

In this outcome, learners will complete a detailed action plan for completion of the specialist project within the set timescale. This should include, as a minimum:

- a detailed breakdown of key milestones from starting the project up to submission of the completed project report
- resources required at each stage (and reasons for their selection)
- time expected for completion and interim target completion dates.

Learners should also consider possible setbacks to their planned schedule and contingency plans to ensure timely completion of the project.

**Topic 2.1**

Learners will plan operations required to carry out a selected specialist project, to include

- project planning techniques
  - critical path analysis
  - Gantt charts
- sequencing of activities
- working to deadlines
- allowing for other commitments
- project action plan:
  - aims
  - objectives
  - specific operations / tasks
  - start and completion dates
  - time required
  - resources required
  - possible disruptions to plan eg illness, IT problems, resource problems, cost
  - Contingencies
  - remedial actions

**Topic 2.2**

Learners will justify reasons for resources selected based on suitability, availability and cost, to include

- people
- time
- buildings
- equipment
- animals
- materials
- literature and media eg internet, trade magazine
- IT applications and budget.

## Learning outcome

**3. Carry out specialist projects**

## Topics

3.1 Monitor progress

3.2 Health and safety implications

In this outcome, learners will conduct and complete their specialist project, collecting supporting evidence as appropriate, for example literature review, artefacts, witness statements, photographs or videos. Whilst doing this, they should maintain a log or diary of all actions, and regularly monitor their progress against their action plan. It would be appropriate for tutors to conduct progress reviews at key stages of the project. As part of conducting the project, learners should discuss any health and safety implications of their work, and identify any relevant legislation or codes of practice. Risk assessments may contribute to evidence of this.

**Topic 3.1**

When carrying out their project, learners will monitor progress against deadlines using a diary or action log.

Learners will monitor performance against

- schedule plan ie daily, weekly, monthly progress
- budget
- other appropriate measures for each tasks.

Learners will capture reasons and remedial actions if falling behind schedule using a diary or action log.

Deadlines can be defined as interim, key milestones or final, and should be reviewed at regular intervals by tutor/supervisor.

**Topic 3.2**

Learners will discuss the health and safety implications, where applicable, of the specialist project, taking into consideration

- health and safety
- risk assessment
- Personal Protective Equipment (PPE)
- relevant regulations and legislation
- codes of practice.

## Learning outcome

**4 Evaluate specialist projects**

## Topics

4.1 Report on project

4.2 Evaluating achievements and areas for improvement

In this outcome, learners will produce a summary report of their project and the process of its completion. This should cover, as a minimum:

- title
- aims / objectives

- review of existing literature / information
- methodology
- results / findings
- conclusions
- references.

**Topic 4.1**
Learners will report on the project either in a written report format, or verbally through a presentation.

**Topic 4.2**
Learners will evaluate achievements and areas for improvement for their specialist projects, including

- conduct and management of the project
  - action plan
  - keeping to deadlines
  - problems and remedial actions
  - project results/findings
  - strengths and weaknesses

- Areas for improvement
  - Planning
  - Implementation methodology
  - results/findings
  - report
  - topics for further investigation

## Guidance for delivery

This unit is designed to encourage and develop learners' independent thinking and research skills. The concept of the project is applicable across all of the vocational areas in the environmental and land-based sector, and learners should be guided and encouraged to select a project topic that is particularly relevant to their interests. Suitable project topics could include

- trial or experiment
- investigation of an issue important to the sector
- production of a structure or artefact
- training programme
- improving a process
- investigation of a new product or service.

All referencing should comply with academic conventions.

The project evaluation should consider the strengths and weaknesses of the finished project and the process of its completion. Consideration of the usefulness and importance of project planning, and ways in which the project could have been improved.

# Unit 350 Principles of tree felling and chainsaw use

| | |
|---|---|
| **UAN:** | R/507/4638 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of the principles of chainsaw maintenance, felling small trees (200- 300mm at felling height) and stump removal and how these can be applied in practice. This unit is aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will identify and understand a range of petrol-driven chainsaws and felling techniques currently used within the industry, to develop efficient chainsaw maintenance skills and to carry out basic repairs and troubleshooting.

If learners want to achieve the Level 2 Award in Chainsaw and Related Operations they will register and take the assessment separately through City & Guilds.

## Learning outcomes

In this unit, learners will:

1. Understand the uses of chainsaws and commonly used methods for dealing with problem trees
2. Maintain chainsaws to manufacturer's recommendations
3. Safely fell and cross cut small diameter trees
4. Safely use stump and brush removal methods

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand the uses of chainsaws and commonly used methods for dealing with problem trees**

#### Topics

1.1 The variety of uses of chainsaws
1.2 Assessment of different problem trees
1.3 Methods for felling problem trees
1.4 Evaluate tree felling activities

In this outcome the learners will assess a number of factors involved with tree felling and chainsaw use (these include problem trees). The learner will identify problem trees up to 380mm at felling height and understand how to deal with them but will not work on them.

**Topic 1.1**

The learners will understand the uses of chainsaws such as:

- felling
- cross cutting
- de-limbing / snedding
- logging
- tree surgery
- chainsaw carving.

**Topic 1.2**

The learners will understand assessment of different problem trees such as:

- 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.

**Topic 1.3**

The learners will know methods for felling problem trees including:

- dismantling
- use of mechanical aids (eg winch, felling lever, wedges)
- specialist cutting techniques (eg safe-corner cut, Danish pie, split level, dog tooth)

**Topic 1.4**

The learners will evaluate tree felling activities from the following standpoints:

- suitability for purpose
- end product
- disposal of waste
- finished state of site
- cost
- labour involved
- environmental impact
- disturbance to public
- risk involved.

## Learning outcome

**2. Maintain chainsaws to manufacturer's recommendations**

## Topics

2.1 Safety features of a chainsaw
2.2 Inspect and carry out maintenance operations on selected chainsaws
2.3 Identify common faults in chainsaws

In this outcome learners will carry out routine maintenance tasks on chainsaws with a maximum guide bar length of 380mm. They will also learn how to understand common chainsaw faults. The faults may be engine related, assembly related or evident by chainsaw use and identified by cutting problems.

**Topic 2.1**

The learners will understand the function of the 10 safety features on a chainsaw. The safety features are:

- flared rear handle
- clearly marked and functioning on/off switch
- safety trigger interlock
- safety stickers
- anti-vibration mounts
- front hand guard incorporating the chain brake mechanism
- chain catcher
- exhaust directing fumes away from the operator
- bar and chain combination
- scabbard

**Topic 2.2**

Learners will visually inspect chainsaws and carry out maintenance in accordance with manufacturer's recommendations and health and safety guidelines on the following components:

- air filter
- spark plug
- bar and chain
- anti-vibration mounts

- oil and fuel systems
- starter mechanism
- chain break mechanism
- exhaust

**Topic 2.3**

Learners will identify the common faults on chainsaws to include:

- uneven sharpening (left/right hand)
- incorrect depth gauges
- bent or worn bar
- blocked air filter
- faulty on/off switch
- symptoms of poor or incorrect fuel mix
- lack of chain oil
- worn or slack chain
- worn anti-vibration mounts
- dirty chainsaw

## Learning outcome

**3. Safely fell and cross cut small diameter trees**

## Topics

3.1 Assess risks prior to felling and cross cutting operations

3.2 Methods for felling and cross cutting selected small diameter trees to meet given objectives

3.3 Dispose of waste using appropriate methods

In this outcome learners assess a site and if safe to do so fell small trees with a diameter up to 380mm. They will also cross cut the timber and dispose of the waste. Pre- start checks, safe starting techniques and safe cutting methods will be central to this outcome.

**Topic 3.1**

Learners will assess risks prior to felling operations:

- 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

**Topic 3.2**

Learners will safely fell and cross cut trees whilst considering the following:

a) pre felling:
    - risk assessment carried out
    - escape routes established

- felling only if safe to do so
- direction of fell

b) felling:
- correct use of chainsaw/felling aids
- choice and positioning of cuts
- appropriately sized hinge
- body positioning/stance

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

**Topic 3.3**

Learners will dispose of waste appropriately. Waste disposal will involve:
- meeting the requirements of the site
- cutting waste to a suitable size if required and stacking it as required
- burning or removing of waste if necessary
- considering waste as a secondary source of income

## Learning outcome

**4. Use stump and brush removal methods**

## Topics

4.1 Select appropriate stump and brush removal methods and equipment
4.2 Use appropriate stump and brush removal methods
4.3 Identify environmental impacts of removal method used
4.4 Evaluate commonly used stump and brush removal methods

In this outcome the learners will understand the methods and equipment available for stump and brush removal. They will be able to select and use an appropriate method for a given situation while paying particular attention to safe working practice and the need for PPE.

**Topic 4.1**

Learners will select appropriate stump and brush removal methods and equipment, e.g.:

a) stump removal:
- stump grinder
- winching
- hand digging
- mechanical excavation
- mulcher
- fire
- chemical
- natural processes

b) brush removal:
- chipper
- mulcher
- fire
- brash mat
- dead hedging
- windrow
- brash baling/biomass.

**Topic 4.2**

Learners will safely use stump and brush removal methods, to include:
- signage and barriers as appropriate
- Personal Protective Equipment to include both eye and ear protection
- adherence to codes of practice
- use in accordance with manufacturer's instructions
- reinstatement of soil and ground post extraction.

**Topic 4.3**

Learners will identify environmental impacts of removal methods used including:
- noise
- dust
- stump grindings
- wood chip
- exhaust gas pollution
- possible hydraulic oil pollution
- visual damage
- damage to ground and soil.

**Topic 4.4**

The learners will evaluate commonly used stump and brush removal methods from the following perspectives:
- availability of machinery
- competency of operator
- cost (purchase and hire)
- access
- location
- timing of operations
- waste
- customer requirements
- tree species.

## Guidance for delivery

This unit is designed to provide the learner with a sound knowledge of chainsaws and their use and the skills required to use a chainsaw to fell and cross cut and process the arisings of small trees. It also enables them to remove stumps and to identify and evaluate, but not deal with, problem trees.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery, therefore health and safety issues relevant to the equipment and tasks involved will be stressed and regularly reinforced. Adequate Personal Protective Equipment (PPE), appropriate to the learner, the equipment and the task will be provided and worn in accordance with the associated risk assessment, industry and operator's manual.

This outcome is best initially delivered in a workshop context with eventual move to a working woodland environment. Emphasis should also be put on the need for cleanliness throughout. The requirement for regular maintenance and sharpening and use of the manufacturer's manuals should also be identified.

This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations. If learners want to achieve the Level 2 Award in Chainsaw and Related Operations they will register and take the assessment separately through City & Guilds.

It is recommended that simple trees are used initially and as the learner gains confidence and experience then the working area can be more challenging. It is advised that simulation of a real working environment is used in the first instance. Pre- start checks and safe starting techniques will form part of this outcome.

Particular attention will be made to safe working practice and the need for PPE. Possible danger to the public and fellow workers needs to be emphasised. Where winching is carried out, the learner needs to be aware of how to check and maintain cables and the particular danger of their use.

The learner will learn to identify problem trees but will not work on them. The learner will be made aware of methods of dealing with problem trees. This can all be taught in a real working environment. It is essential that risk assessments are carried out and the learner is not put at risk when examining problem trees. It is possible that some of this may initially be taught in the classroom using slides or PowerPoint presentations. The uses and maintenance of chainsaws will also be understood.

## Suggested learning resources

### Books

Ireland D., 2004. *Winching Operations in Forestry*. The Stationary Office. ISBN 085538638X
Kestel B., 2005. *Chainsaw Operators Manual: The Safe Use of Chainsaws*. Landlinks Press. ISBN 0643090282
Shetterly R. & Blair D., 1995. *Arborist Equipment: A Guide to the Tools and Equipment of Tree Maintenance and Removal*. International Society of Arboriculture. ISBN 188195613X

### Journals,magazines and guides

Arboricultural Advisory Information Service publications
Arboricultural Association newsletter
Forestry and British Timber
Journal of Arboriculture
NPTC workbooks 2001 / 2002 / 2004
AFAG guides
FISA guides

### Websites

http://www.husqvarna.com/uk/support/working-with-chainsaws/different-techniques-for-the-felling cut/

https://www.osha.gov/SLTC/etools/logging/manual/felling/cuts/special_techniques.html

# Unit 351 Identification, planting, establishment and aftercare of plants for forestry and arboriculture

| | |
|---|---|
| **UAN:** | Y/507/4639 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of the identification, planting and care of trees and how this can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will be able to identify trees and shrubs by botanic name and specify woody plants that are suitable for the situation and site. In addition, learners will be able to plant a range of tree types and provide immediate aftercare. They will also be able to specify future maintenance need.

## Learning outcomes

In this unit, learners will:

1. Identify plants
2. Plant trees and shrubs
3. Establish trees and shrubs
4. Understand the aftercare requirements of trees and shrubs

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Identify plants**

### Topics

1.1 Identifying plants by botanical names.
1.2 The nomenclature and taxonomy of plants.
1.3 Features that aid identification of plants in all seasons.
1.4 Keys and available technology used to identify plants by botanical characteristics.

In this outcome learners should concentrate on plants relevant to their chosen industry.

**Topic 1.1**

Learners will identify relevant plants (minimum 40) using the genus and specific epithet in accordance with the binomial naming system.

**Topic 1.2**

Learners will understand nomenclature and taxonomy systems including the following: Carl Linnaeus, vernacular names, binomial scientific names, authorities, kingdom, division, class, order, family, genus, species, epithets, variety and cultivar, inter-specific, inter-generic and graft hybrids.

**Topic 1.3**

Learners will understand the key features that aid identification of plants in all seasons including: leaves, buds, twigs, bark, flowers, fruit, petioles, shape, form and height.

**Topic 1.4**

Learners will use keys and available technology to identify plants by botanical characteristics including: leaf form, shape, arrangement, base, tip, and margin as well as buds, twigs, bark, flowers, fruit and petioles.

### Learning outcome

**2. Plant trees and shrubs**

### Topics

2.1 Plant bare-root and containerised stock
2.2 Provide appropriate support and immediate aftercare to trees

In this outcome learners will carry out planting, support and protection of trees and shrubs. Learners will complete a specified project that should include the planting of a range of nursery stock, use of differing planting techniques, the application of support, protection and immediate aftercare. Learners will meet the requirements of a specification, and should have an awareness of industry best practice requirements, commercial pressure and implications of poor working practices

**Topic 2.1**

Learners will plant bare-root and containerised stock using appropriate methods and in line with a given specification:

- appropriate planting method: mound planting, notch, pit planting, tree spades
- plant trees: work to planting specifications, check stock against order, correct transport and storage, distribution to ensure efficient planting, appropriate planting density and depth, correct working techniques, safe working practices, appropriate disposal of waste, leave worksite in a tidy condition, prevention of pollution, minimise environmental impact

**Topic 2.2**

Learners will demonstrate the application of support, protection and immediate aftercare of the planted stock in line with the specification:

- use appropriate supports as specified: stakes, frames, guys, ground anchors, tree-shelters
- apply appropriate aftercare as specified: fertilisers, irrigation, pruning, pesticides, mulch

## Learning outcome

**3. Establish trees and shrubs**

## Topics

3.1 The range of nursery stock

3.2 The equipment and methods available for establishing trees

3.3 The use of conditioners and ameliorants in tree establishment

3.4 Establish trees and shrubs

In this outcome the learners will explore the establishment of trees and shrubs in a variety of site conditions and requirements that inform the choice of tree species, as well as the choice of establishment methods and nursery stock. Learners will also establish trees and shrubs using appropriate methods and equipment.

**Topic 3.1**

Learners will know a range of nursery stock types, including: transplants, undercut, cuttings, plugs, whips, feathered trees, light standard, standard, heavy standard, semi mature. They will also understand the following stock categories: bare-root, root balled and containerised.

**Topic 3.2**

Learners will know suitable equipment and machinery available for establishing trees. This will include: spades (Standard, Schlick, Mansfield), graft and spike, hydraulic tree spades, rotary planters and augers.

Learners will also understand appropriate methods for planting trees, such as: notch, pit and mound.

**Topic 3.3**

Learners will know different conditioners and ameliorants in tree establishment. These will include: fertilisers, organic materials, mycorrhizae and water retention materials.

**Topic 3.4**

Learners will select and use suitable equipment to establish trees and shrubs using appropriate methods, taking the following into account:

- size, shape and depth of the pit
- appropriate support and protection
- water and drainage needs
- weed and pests control
- fertilisation, conditioners and ameliorants
- formative pruning

## Learning outcome

**4. Understand the aftercare requirements of trees and shrubs**

## Topics

4.1 Methods of protection
4.2 Use of supports
4.3 Aftercare requirements

In this outcome learners will explore the methods of protecting and supporting trees after planting. This should extend to a range of site situations so that the learner can appreciate limitations, feasibility and effectiveness. They will also investigate the aftercare requirements of trees post planting and develop an awareness of the implications on success from poor practice, environmental factors, vandalism, pests and disease. It is accepted that this outcome will require formal delivery but it should be primarily delivered in practical situations.

**Topic 4.1**

Learners will understand a range of methods and materials available for protection following planting:

- mulching
- rabbit spirals and tree-shelters
- fencing
- guards
- tree cages
- tree grilles

**Topic 4.2**

Learners will understand a range of support techniques, equipment available and their application:

- canes
- stakes/ties
- underground anchors
- guy wires

**Topic 4.3**

Learners will know aftercare methods including inspection, beating-up, nutrition, formative pruning requirements, irrigation, mulching, adjustment/removal of support, weeding/competition management and pest/disease control.

## Guidance for delivery

This unit is designed to provide the learner with the knowledge and skills required to successfully identify plants and care for trees appropriate to the area of study. The unit should cover as wide a range of planting and aftercare techniques as possible, appropriate to the area of study as well as those locally or regionally significant to the learners.

Throughout the unit, the emphasis should be on safe working and sound environmental practices. It is expected that the learner will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. It is not a requirement for the learner to operate machinery to clear and prepare sites for planting or use hydraulic tree spades, but if machinery is used it must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Health and safety issues relevant to any machinery and equipment used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessment. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual. It is not a requirement for the learner to use fertilisers, pesticides or other methods of tree protection which require legal approval. Simulation and demonstration could be used to illustrate appropriate methods and equipment which are commonly used, but are unavailable to the learner.

Learners should be given sufficient opportunity to identify a wide range of woodland and amenity trees in their growth and dormant stages. They should also be encouraged to collect and preserve specimens as a means of improving their identification skills.

A wide range of site conditions and planting requirements should be available to study. These will inform the choice of tree species, as well as the choice of planting methods and stock.

The learner should be given the opportunity to explore the interaction between trees and infrastructure, as well as successful and unsuccessful planting combinations. They should also consider the aesthetic value of tree and shrub combinations and how this influences site establishment.

## Suggested learning resources

**Books**


Anon. 2006. *Field Guide to the Trees and Shrubs of Britain.* Reader's Digest. ISBN 0276425073

Agate E. 2000. *Toolcare: 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

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

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
Trout RC. 2006. *Forest Fencing.* Forestry Commission. ISBN 0855386886

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides
BS 8545 (2014.) Trees: from nursery to independence in the landscape. Recommendations

**Journals,magazines and guides**

Arboricultural Association newsletter
Forestry and British Timber
Quarterly Journal of Forestry
The Garden

**Websites**

Cambridge university plant science pages www-saps.plantsci.cam.ac.uk/trees
Woodland Trust www.woodlandtrust.org.uk
http://www.forestry.gov.uk/pdf/ODW1002.pdf/$file/ODW1002.pdf
http://www.peakdistrict.gov.uk/__data/assets/pdf_file/0007/78865/treeplanting.pdf

# Unit 352 Principles and identification of pests, diseases and disorders of trees

| | |
|---|---|
| **UAN:** | L/507/4640 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of pests, diseases and disorders of trees and how this can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will develop a broad perspective of tree pathology and understand the range of common biotic pathogens and abiotic disorders. The signs and symptoms of common biotic pathogens and abiotic disorders will be described and the life cycles of biotic pathogens will be examined. In addition, the learner will evaluate appropriate monitoring, prevention and control measures for common biotic pathogens.

## Learning outcomes

In this unit, learners will:

1. Understand the principles of ill health in trees
2. Diagnose signs and symptoms of common biotic pathogens and abiotic disorders
3. Understand common biotic pathogens.
4. Understand monitoring, prevention and control of common biotic pathogens

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand the principles of ill health in trees**

### Topics

1.1 The principles of ill health in trees

1.2 The common causes of ill health in trees

1.3 The consequences of pests, diseases and disorders for trees

In this outcome learners will investigate the common causes of ill health in trees, the consequences of disease and the systematic approach for the purpose of diagnosis, treatment and control. With a focus upon pathology, learners will develop a knowledge of the signs and symptoms of common diseases which should be relevant to their location.

**Topic 1.1**

Learners will know the requirements for healthy growth of trees and how to recognise unhealthy trees. They will also know a range of factors that pre-dispose trees to ill health, for example: age, environment and injury.

**Topic 1.2**

Learners will know a range of common causes of ill health in trees including:

- biotic pathogens: bacteria, fungi, vertebrate pests invertebrate pests, invasive plants
- abiotic disorders: wind, lightning, frost, drought, nutrient deficiencies, herbicides, air pollution, planting failure
- Human: vandalism, vehicle impact, fire damage, incorrect pruning cuts, mower damage, strimmer damage, root severance, lowered gradient, raised gradient and pollution etc.

**Topic 1.3**

Learners will understand the consequences of pests, diseases and disorders including:

- rot/ fungal colonisation
- physical damage
- growth reduction
- reduced vigour (increased susceptibility to further infection)
- loss of economic, aesthetic and amenity value
- premature death
- dangerous trees and risk assessment

### Learning outcome

**2. Diagnose signs and symptoms of common biotic pathogens and abiotic disorders**

### Topics

2.1 The signs and symptoms of common biotic pathogens

2.2 The signs and symptoms of common abiotic disorders

2.3 Diagnose damage to trees

In this outcome, learners will know a range of common pathogens and disorders of trees specific to their area of study. Learners will consider existing pathogens and disorders relevant to their geographical location but also have knowledge of potential threats from overseas. Learners will diagnose ill health using signs and symptoms, identification keys and sampling

**Topic 2.1**

Learners will understand a range of common biotic pathogens including:

- bacteria
- fungi - examples of Ascomycetes, Basidiomycetes and Oomycetes
- invertebrate pests - examples of Hemiptera, Hymenoptera, Lepidoptera, Coleoptera
- vertebrate pests–examples include squirrels, rabbits, deer hares and voles

**Topic 2.2**

Learners will understand the consequences of common abiotic disorders including lightning, drought, flooding, frost, herbicides, soil problems, nutrient deficiencies, road salt, air pollution, mechanical damage.

**Topic 2.3**

Learners will diagnose ill health in trees using signs and symptom recognition, sampling, use of identification keys.

## Learning outcome

**3. Understand common biotic pathogens**

## Topics

3.1 Lifecycles of common invertebrate, vertebrate, fungal and bacterial pathogens

3.2 The significance of the lifecycle for correctly identifying pathogens

3.3 Host and pathogen relationships

In this outcome learners will explore the life cycles of common pathogens in order to appreciate the host/pathogen relationship and the various stages of infection/infestation. Learners will also consider the significance of the lifecycle stages to aid the identification of pathogens and appreciate the host responses to infection.

**Topic 3.1**

Learners will know the lifecycles of a range of common pathogens including examples of fungi, bacteria, vertebrates and invertebrates. Learners will have a knowledge of reproduction methods and rates, breeding seasons, behavioural characteristics, growth and development, social structure, preferred habitat, food supply and preferences, natural population controls, mode of movement (insect vectors, wind spores, territory)

**Topic 3.2**

Learners will know the significance of life cycles of common pathogens that aid in their identification. A knowledge of seasonality and timing of signs and symptoms, visibility and occurrence (fructifications, grazing damage). Learners will also understand the consequences of misidentification including financial, legal, liability, environmental and reputation issues.

**Topic 3.3**

Learners will be expected to know the host/pathogen relationship of a range of common fungi, bacteria, vertebrate and invertebrates including colonisation and invasion strategies, factors promoting infection, host response mechanisms

## Learning outcome

4. Understand monitoring, prevention and control of common biotic pathogens

## Topics

4.1 Monitoring of common biotic pathogens
4.2 Prevention of common biotic pathogens
4.3 Control of common biotic pathogens
4.4 Legal and environmental considerations associated with control of common biotic pathogens

In this outcome learners will explore the control measures associated with common pathogens. They will gain an appreciation of the monitoring methods relevant to common pathogens including fungi, bacteria, invertebrate and vertebrate threats. They will also investigate the potential prevention and control measures available including the regulatory constraints of cultural, chemical and biological intervention.

**Topic 4.1**

Learners will inspect trees in their immediate environment in order to ascertain the presence and significance of pathogens. They should have knowledge of: signs of insect and mammal activity, visual assessment, decay detection equipment, sampling methods.

**Topic 4.2**

Learners will understand the importance of promoting healthy tree growth in the prevention of ill health. They will explore the practicalities and limitations of: irrigation, feeding, approved repellents, physical barriers, fencing, tree shelters, breeding for natural resistance. Learners will also understand the importance of future species selection and planting plans utilised as a preventative measure to counteract the immigration of pests from other countries. Learners are also know the protocols for plant passports and import legislation, reportable pests and diseases and plant bio-security strategies.

**Topic 4.3**

Learners will know a range of control options for pests and diseases including:

- cultural
- chemical
- biological
- targeted intervention: timely and appropriate control measures within the life cycle of biotic pathogens.

**Topic 4.4**

Learners will know the legislation pertaining to practice and products for controlling tree pests and diseases including:

- Health and Safety at Work Act 1974
- Personal Protective Equipment (PPE)
- Food and Environment Protection Act 1990 (as amended)
- Control of Substances Hazardous to Health (2002) (COSHH)

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

Learners should also explore the implications upon: non-target species, environmental effects of control methods, approved products, occupiers' responsibilities to visitors, risk assessment

## Guidance for delivery

Throughout the unit, the emphasis should be on safe working. It is expected that the learner will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. It is not a requirement for the learner to use pesticides or other approved methods of control. Learners must hold the appropriate Certificate of Competence (PA) or equivalents required by law to apply pesticides if they do so. Simulation and demonstration could be used to illustrate appropriate control methods which are commonly used.

A learner working towards level 3 is likely to have experience of the promotion of the successful establishment and initial growth of healthy trees. This unit aims to extend the learner's knowledge and skills involved with ensuring the long term health of trees. Emphasis should be placed not only on 'doing', but also upon the importance of planning and strategies to promote tree health within their charge. It is important that the learner understands the importance of maintaining an awareness of current legislation and Codes of Practice in relation to tree health and disease management.

Centres are encouraged to introduce employers and specific professionals from the horticulture or forestry or arboriculture industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits throughout the year to add depth to the learner experience.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are linked directly with interactive lessons in a real environment. Learners will be given the opportunity to deal with a range of trees and pathogens in different situations which reflects current industry practice.

## Suggested learning resources

**Books**


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

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

**Journals and magazines**

Arboricultural Association newsletter

Arboricultural Journal

Forestry and British Timber

Horticultural Week

Journal of Arboriculture

Quarterly Journal of Forestry

**Websites**

www.arbtalk.co.uk

www.trees.org.uk

www.forestry.gov.uk

# Unit 353 Urban and community forestry projects

| | |
|---|---|
| **UAN:** | R/507/4640 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of urban and community forestry projects and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will develop employability skills using an appreciation of the history and significance of urban forestry and the issues relating to managing public access in urban and community forestry projects. Methods commonly used to promote public engagement and participation, as well as the significance of stakeholder consultation will also be examined. The learner will be able to produce specifications for an urban or community forestry project, as would be expected in industry, which includes the involvement of the local community.

## Learning outcomes

In this unit, learners will be able to:

1. Understand the benefits of urban and community forestry projects
2. Understand urban and community forestry management issues
3. Understand public involvement in urban and community forestry projects
4. Plan urban and community forestry projects.

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand the benefits of urban and community forestry projects**

### Topics

1.1 The history of urban and community forestry

1.2 The benefits to society of urban and community forestry

**Topic 1.1**

Learners will understand the legislation relevant to the creation of urban and community forest projects including:

- National Parks and Access to the Countryside Act 1949
- Countryside Acts 1967 and 1968
- Town and Country Planning Act 1990

Learners will need an awareness of planning for new homes and towns, including the development of town and country planning legislation, development of countryside access, the historical role of National Urban Forestry Unit, country parks, national parks, community forestry initiatives, National Forest, Tree Council's tree warden scheme, Agenda 21, role of governmental e.g. Local Planning Authorities and Forestry Commission and Non-Governmental organisations e.g. Tree Council.

**Topic 1.2**

Learners will understand how a recent shift in public awareness has increased visits by the public to urban woodlands and forests. Learners will understand the benefits to society including urban greening, carbon sequestration and absorption of gasses, carbon sinks, sustainable wood-fuel initiatives, increased bio-diversity, improved air quality, increased employment prospects, increased visitors, increased property values, increased access to the countryside, healthier lifestyles, reduced energy consumption, financial benefits, regeneration of derelict and industrial land, improved landscapes and increased wildlife habitat and diversity.

### Learning outcome

**2. Understand urban and community forestry management issues**

### Topics

2.1 Differing types of public access

2.2 The legal implications of public access and participation

2.3 Ways in which the public influence management objectives

2.4 Management of urban trees compared to forest trees

2.5 Potential sources of funding and support for urban and community forestry projects

**Topic 2.1**

Learners will understand a variety of legal mechanisms which facilitate access to land including the Countryside and Rights of Way Act 2000, agri-environment schemes, common land, customary access, dedicated land, public right of way and permissive access. Learners will also understand illegal access to land, trespass, criminal trespass, aggravated trespass etc.

**Topic 2.2**

Learners will understand management issues such as local interests, site enhancement/restoration, multiple objectives and local concerns which may influence the management objectives of a project.

Learners will also understand relevant legal implications of public access and participation in urban and community forest projects including:

- Health and Safety at Work Act 1974
- Occupiers' Liability Act 1957
- Occupiers' Liability Act 1984
- Countryside and Rights of Way Act 2000
- Equality Act 2010
- Management of Health and Safety at Work Regulations 1999

**Topic 2.3**

Learners will understand how safety implications, media and public pressure, vandalism, restoration of sites, recreation and how an increased awareness of protecting the UK's 'natural capital' through urban greening initiatives may influence the management objectives of a project. Learners will also understand how the public use of a woodland can influence planning in relation to woodland structure, canopy and stand density.

**Topic 2.4**

Learners will compare the management of urban and forest trees including public visibility, number and range of tree species, access arrangements and facilities, land value, staffing, logistical considerations and individual tree values for both urban and forest trees.

Learners will compare value (amenity /timber), range of tree species, the potential for vandalism, proximity to structures, commercial activities, wind and fire damage and arboricultural and silvicultural systems with relation to urban and community forest projects.

**Topic 2.5**

Learners understand what methods of funding and support are available for these projects such as community initiatives, government grants, commercial loans and sponsorship.

## Learning outcome

**3. Understand public involvement in urban and community forestry projects**

## Topics

3.1 The importance and need for consultation and communication with key stakeholders

3.2 How the public can participate in urban and community forestry projects

3.3 Opportunities and constraints to wider public engagement and participation

3.4 Resources required to engage with the wider public

**Topic 3.1**

Learners will understand the initial and on-going requirements of urban and forestry projects and understand financial needs (community initiatives, grants, loans and sponsorship), public relations (consultations / pressure groups etc.) and any relevant legal requirements.

**Topic 3.2**
In this outcome learners will understand how voluntary participation, individual participation, community participation, residents' and tenants' associations, church groups, schools, conservation groups, local businesses, landowners and youth organisations influence a project.
**Topic 3.3**
Learners will understand how apathy, lack of awareness and information, local considerations such as resources (finance, labour and equipment), social networks, historical experience, legal constraints, public safety, local custom and practice may aid or constrain a project.

**Topic 3.4**
Learners will know resources which may be required to engage with the wider public including venues, facilities, sites, finance, equipment, publications, marketing, labour, training and education.

## Learning outcome

**4. Plan urban and community forestry projects**

## Topics

4.1 Differing options for public participation
4.2 Produce a specification for local community involvement in an urban or community forestry project

**Topic 4.1**
Learners will understand the different methods available for public engagement such as meeting community figures (church clergy etc.), schools, volunteering, 'friends of' groups and local residents.

**Topic 4.2**
Learners will produce a specification for community involvement including:

- site selection
- appropriate objectives
- site design
- management plan
- mechanisms to communicate with key stakeholders
- opportunities for public participation
- marketing requirements
- resources required

## Guidance for delivery

This unit is designed to provide the learner with the knowledge and skills required to understand the history and development of urban and community forestry projects, as well as their current significance and importance to society. The unit should cover a range of urban and community forestry projects, using real case studies, especially those which are locally or regionally significant to the learner.

It is anticipated that the delivery of this unit may initially focus mainly upon formal lectures but it is recommended that as far as is possible, they are linked directly with interactive lessons in a real environment. Where practical learning is undertaken, the emphasis should be on safe working. It is expected that the learner will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working.

A learner working towards level 3 is likely to have experience of the promotion of the establishment and growth of trees. This unit aims to extend the learners knowledge and skills involved with ensuring the successful management of trees within an urban context. Emphasis should be placed not only on 'doing', but also upon the importance of planning and strategies to promote tree health within their charge. It is important that the learner understands the importance of maintaining an awareness of current issues such as legislation and funding in relation to urban and community forestry.

Centres are encouraged to introduce employers and specific professionals from the urban forestry and arboriculture industries to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of urban green space to compare urban and traditional forestry management to add depth to the learner experience and illustrate the benefits of trees in urban settings, as well as the range and diversity of management issues, such as vandalism and public safety. Current and topical issues reported in the media should be highlighted as and when they arise.

## Suggested learning resources

**Books**


Agate, E. 1998. *The Urban handbook: A Practical Conservation Handbook.* Doncaster: BTCV. ISBN 094675215X.

Arnold,HF, (1993) Trees in Urban Design 2nd edition Van Nostrand Reinhold ISBN unkownBending N.A.D. 1997. *Tree Establishment on Landfill Sites: Research and Updated Guidance*. Edinburgh: Forestry Commission. ISBN 0855383518.

Bradshaw, A., Hunt, B. et al. 1995. *Trees in the Urban Landscape: Principles and Practice.* London: Spon Press. ISBN 0419201009.

Britt, C., Johnston, M. 2008. *Trees in Towns II: A New Survey of Urban Trees in England and their Condition and Management.* 9th ed. London: Department for Communities and Local Government. ISBN 1851128891.

Forestry Commission. 1992. *Community Woodland Design: Guidelines*. Norwich: The Stationary Office Books. ISBN 0117103004.

Helliwell, D.R. 1994. *Planting and Managing Amenity Woodlands*. Cheltenham: Arboricultural Association. ISBN 0900978147.

Hibberd, B.G. 1989. *Urban Forestry Practice.* London: HMSO. ISBN 0117102733.

Hibberd, B.G. 1989. *Urban Forestry Practice*. Norwich: The Stationery Office Books. ISBN 0117102814.

Hodge, S.J. 1995. *Creating and Managing Woodlands Around Town*. Norwich:The Stationary Office Books. ISBN 0117103284.

Knoijnendijk, C, Nilsson, K, Randrup, T, Schipperrijn, J 2005 Urban Forests and Trees, Springer-Verlag. ISBN 9783540276845

Konijnendijk, C.C. 2008. *The Forest and the City: The Cultural Landscape of Urban Woodland.* New York: Springer. ISBN 140208370X.

Lawrence, H.W. 2008. *City Trees: A Historical Geography from the Renaissance through the Nineteenth Century*. Charlottesville: University of Virginia Press. ISBN 0813928001.

Trowbridge, P.J., Bassuk, N.L. 2004. *Trees in the Urban Landscape: Site Assesment, Design, and Installation.* Sussex: Wiley Publishing. ISBN 0471392464.

Watkins, J., Wright, T. 2007. *The Management and Maintenance of Historic Parks, Gardens and Landscapes: The English Heritage Handbook.* London: Francis Lincoln. ISBN 0711224390.

**Journals and magazines**

Arboricultural Association newsletter

Forestry and British Timber

Horticulture Week

Journal of Arboriculture

Quarterly Journal of Forestry

Tree News

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

**Websites**

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| England's Community Forests | www.communityforest.org.uk |
| Forestry Research (Forestry Commission England) | www.forestry.gov.uk/fr/infd-88xeev |
| Community Forest Trust | www.cf-trust.org |
| The Mersey Forest | www.merseyforest.org.uk |
| National Urban Forestry Unit (Archive) | www.bbcwildlife.org.uk/node/3576 |

# Unit 354 Woodland habitat management

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|---|---|
| **UAN:** | Y/507/4642 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of the principles of woodland habitat management and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The aim of this unit is to provide learners with the ability to understand the features of woodland habitats and the skills required for their management.

## Learning outcomes

In this unit, learners will be able to

1. Understand the historical development of woodland
2. Survey the structures and features within a woodland ecosystem
3. Understand the management of woodland habitats
4. Manage woodland habitats.

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand the historical development of woodland**

### Topics

1.1 Historical influences that have created the current level of woodland cover in the UK
1.2 The development of woodland types and management systems
1.3 Historic features within woodland

**Topic 1.1**

Learners will understand the historical human and abiotic influences which have shaped woodland cover across the UK including areas such as: the Vera Hypothesis, the ice age, wildwood, Mesolithic, Neolithic, Bronze Age, Iron Age, Roman, Domesday Book, Middle Ages, Industrial Revolution, First World War, Forestry Commission, the Second World War, post-war destruction, 1950s and 60s greening and Forestry expansion including recent community forest initiatives.

**Topic 1.2**

Learners will understand and categorise woodland types and discuss the development of management systems including succession, National Vegetation Classification (wet woodlands, lowland, upland and scrub communities), ancient woodlands, ancient semi-natural, primary and secondary as well as systems such as coppicing, coppice with standards, wood pastures, pannage and wooded common.

**Topic 1.3**

Learners will understand any historic features found within woodlands including woodland name, boundary shape, wood banks, out-grown hedges, ditches, pits, charcoal hearths, saw pits, tracks and indicator species.

### Learning outcome

**2. Survey the structures and features within a woodland ecosystem**

### Topics

2.1 Carry out woodland survey
2.2 Report on structures and features of a woodland ecosystem
2.3 Summarise the ecological importance of a woodland

**Topic 2.1**

Learners will carry out a woodland survey and record the following data::

- risk assessment: identification of potential risks and hazards, severity of potential injury (hazard), likelihood of harm (risk), control methods to minimise or avoid risk
- quantitative data collection (for example quadrats and simple line transects)
- qualitative data collection (quality of habitat, species distribution)

- species identification (flora and fauna)
- Stand composition
- Woodland canopy structure
- Abiotic factors influencing species abundance and diversity
- Archaeological and historic features
- record, map and present information from surveys in various forms (written, data and pictorial) graphs, pie chart and basic statistics etc.

**Topic 2.2**

Learners will report on the ecological structure of a woodland including ground stand composition, the shrub, sub and upper canopy. Learners will also report on the archaeological and historic features as identified in Topic 1.3 such as woodland name, boundary shape, wood banks, out-grown hedges, ditches, pits, charcoal hearths, saw pits, tracks and indicator species.

**Topic 2.3**

Learners will summarise the ecological importance of a selected woodland including, main habitat types present. Micro and mosaic habitats, species abundance/diversity and regionally or internationally significant flora and fauna.

**Learning outcome**

**3. Understand the management of woodland habitats**

**Topics**

3.1 Different woodland habitats and relevant management techniques

3.2 Equipment and resources for practical management of woodland habitats

**Topic 3.1**

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

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

**Topic 3.2**

Learners will 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).

**Learning outcome**

**4. Manage woodland habitats**

**Topics**

4.1 Recommend improvements to the management of woodland habitats

4.2 Produce method statements for improvements to the management of woodland habitats

4.3 Carry out Practical management of woodland habitats

**Topic 4.1 and 4.2**

Learners will recommend and produce method statements for improvements to the management of woodland habitats covering areas such as increased diversity and habitat creation through ride management, scalloping, ecotones, veterinisation, dead wood management, invasive species control, sustainable management, and waste management.

**Topic 4.3**

Learners will safely carry out practical management of woodland habitats, such as: planting/sowing (trees, shrubs and ground flora), thinning, clearance, coppice, glade creation, pond creation, dead wood introduction, bird boxes and bat boxes.

## Guidance for delivery

This unit is designed to provide the learner with sound knowledge and skills required to understand features of woodland habitats and prepare, plan and undertake practical management of woodland habitats. Learners will develop an understanding of the historical influences that have affected woodland cover and understand the range of woodland habitats present today. An understanding of the management techniques available for woodland habitats will be developed along with the opportunity to put some techniques into practice. The unit should cover a wide range of possible activities and potential sites.

Throughout the unit the emphasis should be on safe working and sustainability. It is expected that learners will be aware of safe working practices and be familiar with accepted practices and behaviours within the context in which they are working. The importance of sustainable practices should be woven into the delivery throughout.

This unit aims to extend the learners knowledge and skills involved with woodland habitat management. Emphasis should be placed upon the importance of planning and health and safety. Centres are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of woodlands to add depth to the learner experience and put practices into context.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are they are linked directly with interactive lessons in a real environment. Learners must be given the opportunity to deal with a range of activities in different situations that reflect current industry trends

## Suggested learning resources

**Books**

Agate E. 2001. *Tree Planting and Aftercare: A Practical Handbook*. BTCV. ISBN 0946752257

Agate E. 2002. *Woodlands: A Practical Handbook*. BTCV. ISBN 0946752338

Agate E and Brooks A. 2001. *Waterways & Wetlands: A Practical Handbook*. BTCV. ISBN 0946752303

Bedoyere C. 2004. *A Handbook of Native Trees and Shrub*s. New Holland Publishers. ISBN 1843306069

Bedoyere C. 2004. *Portrait of a Woodland: Biodiversity in 40 Acres*. Search Press. ISBN 1844480135

Buckley G. 1992. *Ecology and Management of Coppiced Woodlands.* Kluwer Academic Publishers. ISBN 0412431106

Forestry Commission. 1997. *The Management of Semi-Natural Woodlands.* Forestry Commission. ISBN 0855382600

Harris E and Harris J. 2003. *Wildlife Conservation in Managed Woodlands and Forests*. 2nd ed. Research Studies Press. ISBN 0863802060

Kennedy F. 2002. *The Identification of Soils for Forest Management.* Forestry Commission. v

Peterken G. 1993. *Woodland Conservation and Management*. 2nd ed. Springer. ISBN 0412557304

Rackham O. 2001. *Trees and Woodlands in the British Landscape: The Complete History of Britain's Trees, Woods and Hedgerows.* Orion Publishing. ISBN 1842124692

Read H and Frater M. 1999. *Woodland Habitats*. Routledge. ISBN 0415180902

Springthorpe G and Myhill N. 1994. *Wildlife Rangers' Handbook*. The Stationery Office Books. ISBN 0117103268

Warren M and Fuller R. 1993. *Woodland Rides and Glades: Their Management for Wildlife*, 2nd Edition. Joint Nature Conservation Committee. ISBN 1873701330

Watkins C. 1990. *Woodland Management and Conservation.* David & Charles PLC. ISBN 0715393294

**Journals and magazines**

British Wildlife

Quarterly Journal of Forestry

**Websites**

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| The Forestry Commission | www.forestry.gov.uk |
| Natural England | www.naturalengland.org.uk |
| The Royal Forestry Society | www.rfs.org.uk |
| The Woodland Trust | www.woodlandtrust.org.uk |
| The Wildlife Trusts | www.wildlifetrusts.org |

# Unit 355 Principles of tree science

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|---|---|
| **UAN:** | H/507/4644 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of tree science. The learners will develop an understanding of tree growth and the impact of environmental conditions upon tree developments. In addition, learners will understand tree structural growth processes and how decay and wounding can impact upon trees and their management.

## Learning outcomes

In this unit, learners will be able to:

1. Understand how trees respond to changes in environmental conditions
2. Understand decay processes in trees
3. Understand wound response in trees
4. Understand tree biomechanics and structural assessment.

## Scope of content

This section gives details of the scope of content to be covered in the delivery of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand how trees respond to changes in environmental condition**

### Topics

1.1 Anatomical features in wood
1.2 Fundamental requirements for tree growth
1.3 How trees adapt their growth and development to their environmental conditions
1.4 How environmental conditions can increase susceptibility of trees to decay and mechanical failure
1.5 How selected environmental conditions can be altered to influence tree growth and development

**Topic 1.1**

Learners will know key anatomical features and associated tissues found in wood (e.g. xylem and phloem, resin ducts, fibre tracheids, vessel elements, axial and radial parenchyma, rays, vascular cambium, earlywood and latewood, diffuse porous and ring porous wood) and understand key anatomical differences between angiosperms and gymnosperm.

**Topic 1.2**

Learners will understand the fundamental requirements for tree growth, typical tree development (i.e. water, oxygen, carbon dioxide, nitrogen, macro nutrients, primary and secondary growth) and morphology (i.e. above and below ground structure).

**Topic 1.3**

Learners will know a range of environmental conditions which may influence tree growth, including meteorological conditions (e.g. temperature, wind, precipitation, humidity), site conditions (e.g. soil type, moisture availability, soil aeration and compaction, exposure, pesticides, pollution, nutrient availability).

Learners will also understand how trees adapt to changes in environmental conditions in order to maintain optimal growth potential

**Topic 1.4**

Learners will understand how environmental conditions can stress trees leading to strain and increase their susceptibility to decay and mechanical failure (e.g. limited light availability, poor soil aeration and moisture availability, wind and snow loading, removal of support).

**Topic 1.5**

Learners will understand how selected environmental conditions (e.g. soil, water availability, , competition, wind exposure, urban constraints) can be managed to influence tree growth

### Learning outcome

**2. Understand decay processes in trees**

## Topics

2.1 Decay in trees
2.2 How decay processes influence structural strength of trees
2.3 How decay detection can be used to assess potential tree failure
2.4 Potential actions to manage decay in trees

**Topic 2.1**
Learners will understand types of decay to include:

- brown rots
- white rots (simultaneous white rot, selective delignification),
- soft rots

**Topic 2.2**
Learners will understand the structural components of wood (i.e. cellulose and lignin) and how decay processes influence structural strength and potential failure of trees through degradation of cell wall structure and components.
Learners will also be familiar with fungal colonisation strategies (i.e. heart rot, unspecialised opportunism, specialised opportunism, active pathogenesis).

**Topic 2.3**
Learners will understand how decay detection methods and devices (i.e. invasive and non-invasive methods) can be used to systematically assess the extent of decay in order to assess the potential risk of tree failure. Learners will understand the limitations of decay detection equipment and methods.

**Topic 2.4**
Learners will know potential actions to manage and maintain trees with regard to their surroundings and potential targets, following identification and diagnosis of decay (e.g. warning signs, physical barriers, removal of targets, habitat and health promotion, pruning and felling, restraint and support systems).

## Learning outcome

**3. Understand wound response in trees**

## Topics

3.1 Growth and defense processes in trees in response to wounding and decay
3.2 How current pruning conventions relate to wound response in trees

**Topic 3.1**
Learners will understand growth and defence processes in trees in response to wounding and decay, to include:

- storage and mobilisation of energy reserves
- physical defences (e.g. thorns, bark, leaf adaptations)
- chemical defences (e.g. resins, gums, tannins)
- *Compartmentalisation* of Decay in Trees (CODIT)
- wound wood and adaptive growth (e.g. wound occlusion)

Learners will understand the potential impact of the age of a tree on the response to wounding and decay.

**Topic 3.2**

Learners will understand how current pruning conventions and practices relate to subsequent tree responses (e.g. energy use within trees, wound occlusion, timing of operations, natural target pruning, branch collars, branch bark ridge, appropriate tools and equipment, British Standard 3998). Learners should also be aware of practical biosecurity considerations associated with wounding trees whilst undertaking pruning activities.

## Learning outcome

4. Understand tree biomechanics and structural assessment

## Topics

4.1 Current biomechanical theories explaining mechanical strength and integrity of trees

4.2 How trees are assessed for potential mechanical failure

4.3 Implications of mechanical failure for tree management

4.4 How weak tree structures can be appropriately managed

**Topic 4.1**

Learners will understand how current biomechanical theories (i.e. axiom of uniform stress, undamaged tree as a self-optimised structure, principle of the minimum lever arm) understand mechanical strength and integrity of trees. Learners should also be aware of other current biomechanical theories.

**Topic 4.2**

Learners will **know** a range of alternative **i**nvasive and non-invasive methods to systematically assess trees for potential mechanical failure (e.g. Visual Tree Assessment (VTA), recognition of defects, acoustic tomography, fractometer, resistograph, electrical resistance, tree pulling). Learners would be expected to be familiar with key visual indicators of potential failure (e.g. root movement, co-dominant stems, included bark, cracks).

**Topic 4.3**

Learners will understand the key potential implications of mechanical failure for tree management (e.g. claims, and prosecution, potential targets aesthetic value, secondary infection,). Learners would be expected to be familiar with examples of tree failure.

**Topic 4.4**

Learners will understand a range of methods which may be used to appropriately manage weak tree structures (e.g. artificial support systems, crown reduction methods or felling).

## Guidance for delivery

This unit is designed to provide a learner with a sound knowledge of tree structure, how trees grow and adapt to their environment and ultimately respond to wounding, ill health and decay. The content and context of the unit should be adapted where possible to the learners' area of study. The unit should cover a range of decay fungi and other pathogens as appropriate to the area of study as well as those locally or regionally significant to the learners. Learners should be able to study trees throughout the year to ensure that they are able to study seasonal growth process and development.

It is anticipated that the delivery of this unit may initially focus upon formal lectures but it is recommended that as far as is possible, they are linked directly with interactive lessons in a real environment. Where practical learning is undertaken, the emphasis should be on safe working. It is expected that learners will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. Simulation and demonstration could be used to illustrate appropriate equipment and techniques, such as decay detection, which are commonly used but unavailable to the learner.

Learners working towards level 3 are likely to have experience of the promotion of the healthy establishment and growth of trees. This unit aims to extend the learners' knowledge and skills involved with ensuring the long term health and management of trees. Emphasis should be placed on the importance of planning and strategies to promote tree health within their charge and the practical application of current theories. It is important that the learners understand current legislation and codes of practice/industry standards which may relate to tree health management. In addition, relevant current and topical issues should be highlighted as and when they arise.

Centres are encouraged to introduce employers and specific professionals from the industry to provide interesting and relevant information to the learners. Teaching would also benefit from visits to a variety of establishments to add depth to the learners' experience.

## Suggested learning resources

### Books


Anon. 2010. *BS 3998:2010 Tree work. Recommendations*. British Standards Institute. ISBN 0580537773

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

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. 2013. *Principles of Tree Hazard Assessment and Management.* Arboricultural Association. ISBN 0900978570

Mauseth J.D. 2014. *Botany: An Introduction to Plant Biology*. Jones and Bartlett Publishers. ISBN 1284068854

Mattheck C. 2002. *Tree Mechanics*. Forschungszentrum Karlsruhe GMBH. ISBN 3923704402

Mattheck C and Breloer H. 1995. *The Body Language of Trees: A Handbook for Failure Analysis.* The Stationary Office Books. ISBN 0117530670

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

Pallardy, S.G. 2007. *Physiology of Woody Plants, 3rd Edition*. Academic Press. ISBN 012388554X

Phillips DH and Burdekin DA. 1992. *Diseases of Forest and Ornamental Trees, 2nd Edition.* The Macmillan Press Ltd. ISBN 0333323572

Schwarze F, Engels J, and Mattheck C 2012. *Fungal Strategies of Wood Decay in Trees*. Springer-Verlag. ISBN 3642631339

Strouts B and Winter T. 2013. *Diagnosis of Ill-Health in Trees, 2nd Edition*. Arboricultural Association. ISBN 0900978589

Thomas P. 2000. *Trees: Their Natural History*. Cambridge University Press. ISBN 052145963X

Watson G. and Green T. 2011. *Fungi on Trees: An Arborists' Field Guide*. Arboricultural Association ISBN 0900978554

Weber K and Mattheck C. 2003. *Manual of Wood Decays in Trees.* Arboricultural Association. ISBN 0900978357


### Journals and magazines

Arborist News
Essential Arb
Forestry Journal
Journal of Arboriculture
Quarterly Journal of Forestry
The Arb Magazine
Field mycology

### Websites

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| The Arboricultural Association | http://www.trees.org.uk/ |
| The Forestry Commission | http://www.forestry.gov.uk |
| The International Society of Arboriculture | http://isaarboriculture.co.uk |

# Unit 356 Tree and shrub pruning and maintenance

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| **UAN:** | M/507/4646 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of tree and shrub pruning and maintenance and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will understand the reasons for undertaking pruning of trees and shrubs and their varying requirements, as well as the law relevant to the work. Common equipment used to undertake this work will be examined, as well as the biological processes of trees and shrubs and their impact upon pruning and maintenance work. The learner will be able to assess trees and shrubs for failure and suggest appropriate pruning and other remedial action.

## Learning outcomes

In this unit, learners will:

1. Understand the pruning of trees and shrubs
2. Prune and maintain trees and shrubs
3. Assess trees for potential failure

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand the pruning of trees and shrubs**

### Topics

1.1 The aims and considerations of pruning trees and shrubs

1.2 Pruning techniques

1.3 The immediate and long term biological processes of trees and shrubs in response to pruning and possible consequences of not pruning

1.4 Legislation relevant to pruning trees and shrubs

**Topic 1.1**

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

- health and safety
- physical access (pedestrian and vehicular)
- improvement of formative appearance (structure, flower, fruit)
- disease controls
- restoration

Learners should also be aware of the threat from competition for space, light, and nutrients. The financial constraints and client requirements of pruning should also be considered.

**Topic 1.2**

Learners will understand the common pruning techniques for trees and shrubs and the British Standard (3998) requirements for crown thinning, crown reduction, crown lifting, formative pruning, dead-wooding, pollarding and coppicing. Learners will also understand the natural target pruning process, branch collars, branch bark ridge, and be able to use appropriate tools and equipment to carry out pruning which should include a range of the above where appropriate.

**Topic 1.3**

Learners will understand how pruning impacts upon energy use, wound response and closure, storage and mobilisation of energy reserves, *Compartmentalisation* of Decay in Trees (CODIT), wound and callus growth and the development of epicormic and adventitious shoots. Learners will understand how the age, species of trees and environmental constraints affect pruning.

**Topic 1.4**

Learners will understand how legislation dictates, restricts and controls pruning operations and should include

- Planning processes, Town and Country Planning Act1990, Conservation areas, The Town and Country Planning (Tree Preservation)(England) Regulations 2012 (TPOs),
- Health and Safety at WorkAct 1974
- Wildlife and Countryside Act (1981) (as amended)
- Highways Act 1980
- Common law
- exemptions

Learners will also understand how failure to carry out pruning could result in nuisance, liability and negligence including high hedges and highway trees.

## Learning outcome

**2. Prune and maintain trees and shrubs**

## Topics

2.1 Plan the pruning and maintenance of trees and shrubs

2.2 Carry out appropriate pruning and maintenance of trees and shrubs

In this outcome learners will plan and carry out pruning work on trees and shrubs. It is not a requirement for the learner to climb or use other mechanisms to access tree crowns to undertake pruning for this outcome but where access/climbing occurs, this should be accompanied by appropriate risk assessment, management and supervision to ensure the safety of the learner.

**Topic 2.1**

Learners will to carry out a survey of tree and shrub condition to identify tree age classes, maintenance work required, prioritisation of work, protection measures and a schedule of works.

**Topic 2.2**

Learners will carry out tree and shrub 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,
- prevention of pollution
- minimising environmental impact.

## Learning outcome

**3. Assess trees for potential failure**

## Topics

3.1 The potential of trees for failure

3.2 Assess trees for potential failure

3.3 Remedial actions for potential failure

In this outcome learners will learn to assess trees using a range of techniques to understand the potential for failure and recommend remedial actions. The learners will be required to assess trees and shrubs for potential failure using a range of techniques. Learners will also know the range of equipment available for investigating internal condition. It is anticipated that the delivery of this outcome will require some formal delivery, but it should be delivered in practical situations and appropriate to the area of study. The learner is required to recommend structural supports and pruning as remedial actions. The potential to erect structural supports will vary according to the trees available and associated requirements, therefore simulation within realistic working environments or review of existing supports may be used if real-work opportunities are not available. It would be beneficial to include learning within the wider context of potential failure.

Reference and links to current biomechanical theories explaining tree structure and development would enhance the learner's understanding.

**Topic 3.1**

Learners will know the variety of symptoms that can lead to failure in trees and shrubs including decay, structural weaknesses, injury, species characteristics, growth habit, site and environmental influences and factors

**Topic 3.2**

Learners will assess trees for failure using non-invasive methods, Visual Tree Assessment (VTA) and recognition of defects. Learners will also have an awareness of sounding and acoustic equipment, increment borer, fractometer, resistograph, radar, tomography devices, and static and dynamic load testing equipment.

**Topic 3.3**

Learners will understand the range of remedial actions available in potential failure situations including invasive and non-invasive methods, cable bracing, flexible bracing, rod bracing, propping, guying, felling, pruning and the implications of these methods on health and safety, risk management and liabilities

## Guidance for delivery

This unit is designed to provide the learner with sound knowledge and practical skills associated with the requirements to maintain trees and shrubs by pruning. The content and context of the unit should be adapted where possible to the learner's area of study. The unit should cover a range of trees and shrubs, as well as techniques and equipment, appropriate to the area of study and those that are locally or regionally significant to the learner. Consideration should be given to the seasonal nature and timing of pruning in relation to tree and shrub species, as well as when signs and symptoms associated with causes of potential failure may be easily observed.

It is anticipated that the delivery of this unit may initially focus mainly upon formal lectures but it is recommended that, as far as is possible, they are linked directly with interactive lessons in a real environment. Where practical learning is undertaken, the emphasis should be on safe working. It is expected that learners will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working.

Any legal permission required to prune trees must be obtained and equipment/machinery used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. If chainsaws are used, the learner must hold a Certificate of Competence in Chainsaw and Related Operations.

Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual. It is a requirement for the learner to use pruning equipment; health and safety issues relevant to the equipment being used must be stressed and regularly reinforced. In addition the learner should be actively involved in comprehensive risk assessment. Simulation and demonstration could be used to illustrate appropriate equipment and techniques, such as decay detection or bracing which are commonly used, but unavailable to the learner.

A learner working towards level 3 is likely to have experience of the promotion of healthy establishment and growth of trees. This unit aims to extend the learner's knowledge and skills involved with ensuring the long term health and management of trees and shrubs. Emphasis should be placed on the importance of planning and implementation of strategies to promote the health of trees within their charge and the practical application of current knowledge. Current and topical issues regarding pruning should be highlighted as and when they arise.

Centres are encouraged to introduce employers and specific professionals from the horticulture, forestry or arboriculture industries to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of establishments to add depth to the learner experience and enable them to examine pruned and un-pruned trees throughout the year.

## Suggested learning resources

**Books**


Arboricultural Association. 1994.*A Guide to Tree Pruning*. Cheltenham: Arboricultural Association. ISBN 090097821X.

Arboricultural Association. 2005. *Arboricultural Association Health and Safety Package*. Cheltenham: Arboricultural Association. ISBN 0900978406

British Standards Institute. 2010. *Tree work - Recommendations (British standard 3998:2010).* London:British Standards Institution.

British Standards Institute. 2012. BS 5837:2012*Trees in relation to design, demolition and construction – Recommendations*. London: British Standards Institution. ISBN 0580464180

Brown G.E., Kirkham T. 2009. *The Pruning of Trees, Shrubs and Conifers*. Portland: Timber Press. ISBN 0881926132.

Lonsdale, D. 1999. *Principles of Tree Hazard Assessment and Management*. Norwich: Stationery Office Books. ISBN 0117533556.

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

Mynors, C. 2010. *The Law of Trees, Forests and Hedgerow.*London: Sweet and Maxwell. ISBN 0421590408.

Shigo A.L. 1989. *Tree Pruning: A Worldwide Photo Guide.* Snohomish: Shigo and Trees Associates. ISBN 0943563089.

Strouts, R.G., Winter, T.G. 2000. *Diagnosis of Ill-Health in Trees*. 2nd ed. Norwich: The Stationery Office Books. ISBN 0117535451.


**Journals and magazines**

Arboricultural Advisory Information Service publications

Arboricultural Association newsletter

Forestry and British Timber

Journal of Arboriculture

Quarterly Journal of Forestry

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Forest Industry Safety Accord (FISA) Safety Guides

**Websites**

The Arboricultural Association – resources page

http://www.trees.org.uk/Help-for-Arborists/Help-becoming-an-ArbAC

# Unit 357 Principles of silviculture

| | |
|---|---|
| **UAN:** | T/507/4647 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of the principles of silviculture and how these can be put into practice. The learner will understand common silvicultural systems, as well as silvicultural techniques and practices used to successfully establish and manage a woodland or forest for commercial gain. Methods commonly used to protect and improve established forests and woodlands will also be examined. The learner will also examine the harvesting systems associated with common silvicultural systems. Learners will understand the silvicultural characteristics of key forestry species, and discuss alternative species for future use in British Forestry. Learners will also develop an understanding of sustainable forest management, particularly in relation to threats from climate change and pests and diseases.

## Learning outcomes

In this unit, learners will be able to:

1. Understand common silvicultural systems and the silvicultural characteristics of a range of forestry species
2. Understand the requirements for the successful establishment of forests or woodland
3. Understand how to protect and improve forest and woodland
4. Understand common harvesting systems.
5. Understand the principals of sustainable forest management

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

1. **Understand common silvicultural systems and the silvicultural characteristics of a range of forestry species**

### Topics

1.1 Common silvicultural systems

1.2 Silvicultural characteristics of forestry species

In this outcome learners will be required to understand common silvicultural systems. It is accepted that this outcome will require formal delivery but it should be primarily delivered in practical situations. It would be beneficial to include learning within the wider context of silvicultural systems. For example, reference and links to non-timber management aims and objectives would enhance the learner's experience. Learners will also understand the silvicultural characteristics of a range of forestry species including those commonly used in British forestry, and those of potential use in the future. Current and topical issues should be highlighted as and when they arise.

**Topic 1.1**

Learners will understand common silvicultural systems, which should include:

- coppice
- coppice with standards
- clear-cutting system
- selection system
- group system
- strip system
- shelterwood system
- agroforestry systems

**Topic 1.2**

Learners will understand the silvicultural characteristics of a range of minimum 30 forestry tree species, including those commonly associated with British forestry, and those of potential use in the future. Characteristics should include:

- identification features
- site requirements (soil type, moisture regime, temperature regime, shelter, shade tolerance)
- pests and diseases
- appropriate silvicultural systems
- timber properties and uses

Learners should also be able to identify and describe the characteristics of a minimum of 10 shrub species associated with forest stands.

## Learning outcome

**2. Understand the requirements for the successful establishment of forests or woodland**

## Topics

2.1 The requirements of artificial and natural regeneration systems

In this outcome, learners will understand the requirements for the successful establishment of forests or woodland. It would be beneficial to include learning within the wider context of forestry establishment. Reference and links to common nursery practices would enhance the learner's experience. In addition, current and topical issues should be highlighted when they arise.

**Topic 2.1**

Learners will understand the requirements of artificial and natural regeneration systems including:

- high forest systems
- even aged/uniform/regular systems
- uneven aged/irregular systems
- species mixtures
- nurse crops
- underplanting
- direct seeding
- coppice systems

## Learning outcome

**3. Understand how to protect and improve forest and woodland**

## Topics

3.1 Techniques and practices to protect forests and woodlands from fire

3.2 Techniques and practices to protect forests and woodlands from pests and pathogens

3.3 Techniques and practices to protect forests and woodlands from weeds

3.4 Management objectives and maintenance practices associated with individual silvicultural systems

In this outcome learners will understand how to protect and improve forests and woodlands. The learner should be able to experience as wide a range of real examples of techniques and methods as possible; this may vary according to the forest sites available.

**Topic 3.1**

Learners will understand the causes of fire, ignition sources, danger periods, types of fire (ground, surface, crown), fire behaviour, impact upon crop, financial implications and insurance.

Learners will need an awareness of fire prevention methods: ride layout and removal of combustible material. Learners will also know about approaches to firefighting including communication systems, water supplies, emergency services, provision and location of equipment.

**Topic 3.2**

Learners will understand techniques and practices to protect forests and woodland from pests and pathogens including bacteria, fungi, vertebrate pests (rabbits, deer, squirrels, humans), and invertebrate pests. The impact upon crop and financial implications will also be discussed.

Learners will know survey methods including monitoring of faeces, damage type, timing of damage, distribution and frequency of damage and decay detection equipment.

Learners will know trapping methods (including approved traps, use of pheromones, pesticides and repellents), physical barriers (fencing, tree shelters, guards) and breeding for natural resistance (species selection, plant passports and import legislation, biological control (predators and parasites), shooting and culling, pruning and sanitation felling).

**Topic 3.3**
Learners will understand techniques and practices to protect forests and woodlands from competing vegetation including woody vegetation, herbaceous vegetation and grass.

Learners will understand appropriate control methods including approved herbicides, mulching, tree shelters, manual weeding, motor-manual weeding and mechanised weeding. The impact upon crop and financial implications will also be considered.

**Topic 3.4**
Learners will understand the management objectives and maintenance practices associated with individual silvicultural systems. Management objectives will include: improvement of timber qualities, improvement of access, improvement of form, increasing visibility, minimising windthrow risk, management of competition, weed control and maintenance of optimum stocking densities.
Learners will understand management practices including:

- thinning: thinning methods (manual, motor-manual, mechanised), thinning intensity, thinning cycles, timing, thinning regime (systematic, selective), thinning yield, residual stand characteristics
- re-spacing: methods (manual, motor-manual, mechanised), timing (eg crown closure)
- brashing and pruning: types (formative pruning, high pruning), residual stand characteristics, timing

The impact of management practices upon the crop and financial implications will also be considered.

## Learning outcome

**4. Understand common harvesting systems**

## Topics

4.1 Harvesting activities associated with common silvicultural systems

In this unit learners will understand common forest harvesting systems. It is anticipated that the delivery of this outcome will require some formal sessions but it should be primarily delivered in practical situations. The learner should be able to experience as wide a range of real examples of systems and methods as possible; this may vary according to the forest sites available.

**Topic 4.1**
Learners will understand the features of common harvesting systems including:

- tree length system
- shortwood system

- whole tree system
- felling and delimbing methods (manual, motor-manual, mechanised),
- extraction to roadside (skidder, forwarder, cable crane, horse), transport to market, road systems (planning, design, construction, intensity)
- terrain classification and machinery optimisation
- windthrow risk
- crop characteristics and market requirements.

## Learning outcome

**5. Understand the principals of sustainable forest management**

## Topics

5.1 Principles of sustainable forest management

In this outcome learners will develop an understanding of sustainable forest management in the UK. It is anticipated that delivery of this outcome will primarily involve formal classroom delivery, although case studies and practical examples should be used to apply theory. Key requirements of sustainable forest management in the UK should be addressed, along with current guidelines for implementation and monitoring. Current and topical issues should be highlighted as and when they arise.

**Topic 5.1**
Learners will understand the principles of sustainable forest management including: the concept of sustainability, development of sustainable forestry in the UK, the Forestry Standard, aspects of sustainable forest management (biodiversity, climate change, historic environment, landscape, people, soils, water), implementing sustainability (felling licences, incentives, management plans, restocking), carbon sequestration, pests and diseases, certification schemes (FSC, UKWAS).

# Guidance for delivery

This unit is designed to provide the learner with the knowledge of the principles of sustainable silviculture associated with the successful raising, tending and harvesting of forest crops. The unit should cover as wide a range of common operations as possible to enable the learner to adapt and apply their knowledge to the range of forest and woodland types they may encounter and focus on methods locally or regionally significant to the learner.

Throughout the unit, the emphasis should be on safe working and good environmental practices. It is expected that the learner will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. It is a not requirement for learners to operate or use equipment. However, if the learner is given the opportunity to undertake practical silvicultural techniques and practices, health and safety issues relevant to any equipment used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessment. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the equipment and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual. It is not a requirement for the learner to use pesticides or other approved chemical or trapping methods. Simulation and demonstration should be used to illustrate appropriate methods and equipment, particularly those commonly used, but unavailable to the learner.

A learner working towards level 3 is likely to have experience of practical forestry activities. This unit aims to extend the learner's knowledge and skills involved with the practical establishment and maintenance of healthy forests and woodlands. Emphasis should be placed upon the importance of long term planning and strategies to ensure safe, efficient, effective and successful implementation of tree management systems. It is important that the learner understands the importance of maintaining awareness and understanding of current legislation and Codes of Practice in relation to forest and woodland management.

Centres are encouraged to introduce employers and specific professionals from the forestry industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner experience by studying sustainable management systems and machinery in operation. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of forest and woodland work and the impact of extreme weather conditions on operations.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are they are linked directly with interactive practical lessons in a real environment. The learner must be given the opportunity to examine a wide range of harvesting and extraction equipment and machinery in different forest and woodland situations which reflects current industry practice. It is anticipated that the range of machinery may include that adapted from the construction or agricultural industries as well as purpose built equipment.

## Suggested learning resources

### Books


Agate E. 2001. *Tree Planting and Aftercare: A Practical Handbook*. BTCV. ISBN 0946752256

Agate E. 2002. *Woodlands: A Practical Handbook.* BTCV. ISBN 0946752331

CAB 2014. *THE Forestry Compendium*

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 0117102811

Kerr G. 1993. *Growing Broadleaves for Timber.* Forestry Commission. ISBN 0117103146

Kerr G and Haufe, J. *Thinning Practice - A Silvicultural Guide*. Forestry Commission, ISBN

Matthews JD. 1991. *Silvicultural Systems.* Oxford University Press. ISBN 0198546702

Mason WL. 1999. *Cultivation of Soils for Forestry.* Forestry Commission. ISBN 0855384005

Potter MJ. 1991. *Treeshelters.* Forestry Commission. ISBN 0117102880

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


Best Practice Guidance including Forest Industry Safety Accord (FISA) and Arboriculture and Forestry Advisory Group (AFAG)

### Journals and magazines

Forestry and British Timber
Quarterly Journal of Forestry
The UK Forestry Standard

**Websites**

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|---|---|
| Forestry Commission | http://www.forestry.gov.uk/england |
| Forest Research | http://www.forestry.gov.uk/forestresearch |

# Unit 358 Emergency tree works

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|---|---|
| **UAN:** | F/507/4649 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of the principles of emergency works and how they are applied in the industry. There is a limitless range of emergency situations that can occur dependent on varying locations, the trees and the targets beneath them. This unit provides the necessary knowledge of procedures and protocol to deal with emergency situations. It is designed for learners in a centre-based settings looking to progress into the sector or further education and training. This unit aims to provide learners with sufficient skills to understand the requirements of operatives attending emergency tree works including relevant legislation, procedures, and the considerations that may be required in differing site situations.

## Learning outcomes

The learner will be able to:

1. Understand the procedures for dealing with emergencies and emergency services
2. Understand the principles of emergency tree work operations
3. Understand health and safety legislation and industry best practice relevant to emergency tree work
4. Produce risk assessments and method statements for emergency tree work

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand the procedures for dealing with emergencies and emergency services**

### Topics

1.1 Procedures for dealing with emergencies and emergency services

1.2 The importance of communication and team working

**Topic 1.1**

Learners will describe the procedures required for dealing with emergencies and the emergency services prior to, during and post completion of work. Procedures include: initial contact, correct paperwork and company policies, response time, liaising with other agencies on-site, agreement of works strategy or method statement and completion of works agreed.

**Topic 1.2**

Learners will understand the importance of communication during emergency works, not just with other team-members but with other operatives on-site and with the emergency services, to include

- safe working environment
  - exclusion zone
  - escape routes are clear and maintained
  - access and egress routes for machinery and third parties are clear
- roles and responsibilities
  - chain of command
  - clear and unambiguous
- communication
  - hierarchy of notification
  - team members
  - other operatives
  - emergency services
  - general public
- site specific risk assessment
  - signed by anyone entering work zone
- balancing safety with efficiency
  - know your limits
  - competent operatives, examples of certification
  - equipment fit for purpose

## Learning outcome

**2. Understand the principles of emergency tree work operations**

## Topics

2.1 Hazards and considerations with tree failure due to windthrow

2.2 Hazards working in challenging circumstances

2.3 Environmental damage

2.4 Using winches to assist in emergency works

**Topic 2.1**

Learners will understand how to use visual or current technological mechanisms for ascertaining safe climbing conditions during periods of high winds. Learners will also be able to demonstrate, albeit at a reduced scale using hand saws etc. the principles of processing windthrown trees including:

- hazard evaluation
- order of priority including trees blocking emergency vehicles
- tension and compression of branches
- supporting branches / leaving supporting branches
- dealing with branches over shoulder height
- rolling tree/stem
- root-plate instability and reaction to severance
- making the remaining root-plate safe once severed
- potential to move debris to safe working area.

**Topic 2.2**

Learners will understand the potential hazards associated with the site when working in differing emergency locations including:

- damaged buildings
  - falling masonry
  - unstable structure
- proximity to highways
  - vehicular collisions
  - driver distraction
- proximity to water
  - precautions
  - rescue requirements
- damaged power lines
  - do not work until safe to do so
  - contact Distribution Network Operator (DNO) immediately
  - utility arboriculture (UA1 / UA2 etc.)
- artificial lights / shadows.

**Topic 2.3**

Learners will understand how environmental damage can occur as a result of unpredicted tree failure. This will include damage to retained trees, destruction of valuable habitat, flora or fauna, contamination of watercourses either as a direct result of tree failure or as a result of secondary contamination from equipment.

**Topic 2.4**

Learners will understand factors to consider and additional safety precautions when using winches in emergency tree works, such as: pre-use inspection of suitable equipment, compliance of equipment to current legislation, Safe Working Load (SWL), moving load, winching system type, winching methods (suitability and height of anchor and load, danger triangle, off-set winching), operator competence.

Learners will also understand the benefits of using a winch during emergency tree works and demonstrate how to prepare and secure a winch to a suitably weighted movable object.

## Learning outcome

**3. Understand health and safety legislation and industry good practice relating to emergency tree work**

## Topics

3.1 Key legislation relating to emergency tree work
3.2 British Standards and Approved Codes of Practice

**Topic 3.1**

Learners will know the main points of key legislation including:

- Health and Safety at Work Act 1974
- Management of Health and Safety Regulations 1999
- Personal Protective Equipment Regulations 1992
- Reporting Incidents, Diseases and Dangerous Occurrence Regulations 2013
- Provision and Use of Work Equipment Regulations 1998
- Lifting Operations and Lifting Equipment Regulations 1998
- Work at Height Regulations 2005
- Control of Noise at Work Regulations 2005
- Control of Vibration at Work Regulations 2005
- Electricity Safety, Quality and Continuity Regulations 2006

**Topic 3.2**

Learner will know the role and importance of industry best practice guidance, approved codes of practice, to include: Arboriculture and Forestry Advisory Group (AFAG) leaflets, Forest Industry Safety Accord leaflets, AA Guide to Good Climbing Practice, HSE guidance

## Learning outcome

**4. Produce risk assessments and method statements for emergency tree works**

## Topics

4.1 Understand the use and importance of risk assessment
4.2 Produce an appropriate risk assessment
4.3 Understand the use and importance of method statement
4.4 Produce an appropriate method statement

In this outcome learners will explore the importance of, and will prepare the risk assessments prior to emergency tree work, and method statements to define works.

**Topic 4.1**

Learners will understand the use and importance of risk assessments prior to works. Learners will know their obligations and responsibilities in relation to risk assessment, including:

- application, review and monitoring
- training requirements
- generic and site specific risk assessments
- compliance
- emergency action plans

**Topic 4.2**

Learners will be able to produce a site specific risk assessment

**Topic 4.3**

Learners will understand the use and importance of method statement to define works. Learners will know their obligations and responsibilities in relation to method statements, including:

- equipment, staff and methods employed
- training requirements
- compliance
- emergency procedure
- pursuit and completion of contracts
- partnership works (eg CSCS, CITB)
- application, review and monitoring

**Topic 4.4**

Learners will produce a method statement for a controlled scenario without being exposed to any significant hazards. This may involve a practical scenario in which the tutor has access to a windthorwn tree or a written scenario appropriately described with photographs to show the site. The method statement will be linked to the risk assessment produced in Topic 4.2

## Guidance for delivery

This unit is designed to provide the learner with knowledge and understanding of the principles and procedures of emergency tree work. Learners will understand how to promote health and safety and good practice when undertaking arboricultural operations. Leaners are not expected to carry out a range of complex and skilful emergency works due to the dangerous nature, associated hazards and access to resources, Learners should however be able to deal with lower risk activities for example a windblown tree across a path in a woodland. To create a broader understanding of more complex higher risk emergency procedures lecturers must provide learners with many scenario based exercises and actives. This could involve creating a practical scenario in which the learners must respond to an emergency situation and the lecturer must assess health and safety, knowledge, skill and adherence to procedures. This could also involve evaluating films, discussing photographs and role play in written scenarios.

Throughout the unit the emphasis should be on safe working and sustainability. It is expected that learners will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. The importance of sustainable practices should be woven into the delivery throughout.

Emphasis should also be placed upon the importance of legislation and good practice guidance with particular emphasis on risk assessment and method statements. Centres are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner.

It is accepted that formal lectures will be necessary at level 3, but for this unit it is recommended that they are linked directly with interactive lessons in a real environment including site visits. Learners must be given the opportunity to deal with a range of activities in different situations that reflect current industry trends.

Where learners operate machinery, health and safety issues relevant to the task being carried out and the machinery used must be stressed and regularly reinforced. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual. Simulation and demonstration could be used to illustrate effective/ineffective work scheduling and the impact of external factors upon site/job management but where possible, real projects should be used.

## Suggested learning resources

**Books**


Mattheck C. 2007. *Updated Field Guide for Visual Tree Assessment.* Forschungszentrum Karlsruhe Gm. ISBN-10: 3923704593

Cox S. 2011. *Urban Trees: A Practical Management Guide.* The Crowood Press Ltd. ISBN-10: 1847972985

Arboricultural Association. 1995. *Health and Safety Package for Commercial Arboriculture.* Arboricultural Association. ISBN 0900978406

Arboricultural Association. 1994. *A Guide to Tree Pruning*. Cheltenham: Arboricultural Association. ISBN 090097821X.

Arboricultural Association. 2005. *A Guide to Good Climbing Practice*. Arboricultural Association. ISBN 0900978392

Arboricultural Association. 2005. *Arboricultural Association Health and Safety Package*. Cheltenham: Arboricultural Association. ISBN 0900978406

Arboricultural Association. 2008. *A Guide to the Use of MEWPs in Arboriculture*. Arboricultural Association. ISBN 0900978449

British Standards Institute. 2010. *Tree work - Recommendations (British standard 3998:2010).* London: British Standards Institution.

Donzelli PS and Lilly SJ. 2001. *The Art and Science of Practical Rigging*. International Society of Arborists.

Ireland D. 2004. *Winching Operations in Forestry*. The Stationary Office Books. ISBN 085538638X

Jepson J. 2000. *The Tree Climber's Companion*. Access publishing Inc. ISBN 0615112900

Kestel B. 2005. *Chainsaw Operator's Manual: The Safe Use of Chainsaws*. Landlinks Press. ISBN 0643090282


**Journals and magazines**

Arboricultural Advisory Information Service publications

Arboricultural Association newsletter

**Websites**

The Arboricultural Association – resources page http://www.trees.org.uk/Help-for-Arborists/Help-becoming-an-ArbAC

The Health and Safety Executive http://www.hse.gov.uk/

# Unit 359 Operate, maintain and understand the principles of equipment used for timber processing and conversion

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|---|---|
| **UAN:** | T/507/4650 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of timber conversion and utilisation and how this can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The processing and conversion of felled trees and arisings into added value marketable products is an important core and diversified activity for many tree related businesses. In this unit the learner will be able to maintain and safely operate a range of timber processing and conversion equipment to produce timber products. They should also consider criteria used to select appropriate equipment to produce specific products. The learner will also evaluate how timber products are marketed and the factors that influence timber product utilisation and the need for timber preservation.

## Learning outcomes

In this unit, learners will be able to

1. Understand timber processing and conversion equipment
2. Maintain timber processing and conversion equipment
3. Operate timber processing and conversion equipment to produce marketable products
4. Understand timber utilisation and the preservation process.

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand timber processing and conversion equipment**

### Topics

1.1 The range of equipment to process and convert round timber into final products

1.2 The criteria for selecting appropriate equipment to produce specific products

In this outcome, learners will review and assess a range of timber processing and conversion equipment and understand the characteristics of the final products. Wherever possible this should include equipment commonly used and which the learner has access to. Learners will consider selection criteria appropriate to the range of equipment reviewed. This outcome will require formal delivery but it could also be delivered in practical situations such as trade shows where learners are able to view and compare a range of equipment. In addition, the learners should be encouraged to obtain and review manufacturers' information.

**Topic 1.1**

Learners will understand the use of common timber processing and conversion equipment, and their end products, to include:

- chainsaws
- firewood processors
- debarkers
- charcoal kilns
- log splitters
- peeler pointers
- circular saw benches
- chainsaw mills
- sawmills (small and large scale)
- brushwood chippers

Learners will take into consideration alternative options associated with the range of equipment reviewed (e.g. mounted, self-propelled, pedestrian operated).

**Topic 1.2**

Learners will understand the criteria commonly considered when selecting equipment to produce specific products, to include:

- suitability for purpose (e.g. raw input requirements and quality characteristics of the final product)
- effectiveness
- environmental considerations
- rate of work and production capacity
- operator training and experience
- legal implications
- maintenance and servicing (e.g. spares availability, dealer support)

- financial implications (e.g. purchase cost, leasing, insurance, servicing and parts, depreciation)
- compatibility with other machinery
- market requirements
- transport and set up requirements

## Learning outcome

**2. Maintain timber processing and conversion equipment**

## Topics

2.1 The importance of routine and non-routine maintenance

2.2 Common equipment faults and potential remedial action

2.3 Undertake routine equipment maintenance

In this outcome, learners will understand the importance of maintaining equipment and carry out routine maintenance. Wherever possible this should include equipment commonly used and which the learner has access to. Learners should also be able to identify common faults and suggest appropriate remedial action. It is anticipated that the delivery of this outcome will require some formal delivery, but it should be primarily delivered in a realistic industrial environment where possible. It is expected that the learner will be given access to appropriate workshop facilities and tools to maintain the equipment. It is essential that the manufacturer's guidance is available to undertake this work.

**Topic 2.1**

Learners will understand the importance of routine and non-routine maintenance, as well as essential checks, appropriate to the equipment they maintain, for example:

- legal requirements
- maintaining efficient operation
- minimising breakdowns
- cost implications
- guarding and safety requirements
- fluid levels
- impact on product quality
- frequency of checks and service intervals
- logging hours of use
- pre-start checks
- cleaning and inspection after use

Learners will also understand the implications and potential impact (e.g. legal, financial, human and environmental) of not maintaining equipment in line with the manufacturers' or suppliers' guidance.

**Topic 2.2**

Learners will identify common faults of at least three pieces of timber processing and conversion equipment and suggest potential remedial action, for example:

- incorrect, polluted or lack of fuel
- blocked filters
- poor oil pressure
- damaged sprockets and fouled drive systems

- damaged or dull cutters/blades
- fouled spark plugs
- bad earth connection
- blocked mechanisms

**Topic 2.3**
Learners will carry out routine maintenance of at least three pieces of timber processing and conversion equipment as listed in Topic 1.1. They will perform pre-start checks as per manufacturers' or suppliers' guidance and operator's manual**.** Where appropriate, learners will also replace and adjust operator serviceable components (e.g. blades, anvils, cutting teeth, bearings, tyres, filters, greasing, traction aids).

## Learning outcome

**3. Operate timber processing and conversion equipment to produce marketable products**

## Topics

3.1 Current relevant legislation and industry guidance
3.2 Carry out risk assessments and pre-start checks as per manufacturers' recommendations
3.3 Safely prepare raw wood materials for processing and conversion
3.4 Safely operate processing and conversion equipment to produce timber products to given specifications

In this outcome, learners will appropriately prepare, and then safely operate timber processing and conversion equipment to produce marketable products. Learners will be aware of and comply with the legal requirements and industry best practice appropriate to the equipment they are operating. It is anticipated that the delivery of this outcome will be through supervised practical training and the learner will be able to consolidate operational skills within realistic working environments. The learners should be given appropriate time to develop operational skills before assessment. The learners are not required to transport machinery, but should be aware of transport requirements.

**Topic 3.1**
Learners will have an understanding of the key points of legislation relevant to the processing and conversion equipment they are operating, for example:

- Provision and Use of Work Equipment Regulations 1998 (PUWER)
- Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)
- Health and Safety at Work Act 1974
- Management of Health and Safety at Work Regulations 1999
- Control of Substances Hazardous to Health Regulations 2002 (COSHH)
- Manual Handling Operations Regulations 1992
- Personal Protective Equipment (PPE) at Work Regulations 1992
- Environmental Protection Act 1990
- Control of Noise at Work Regulations 2005
- Control of Vibration at Work Regulations 2005

**Topic 3.2**
Learners will carry out risk assessments appropriate to the processing and conversion equipment they are operating in accordance with the Management of Health and Safety at Work Regulations 1999.

Learners will also carry out pre-start checks and adjustments, appropriate to the equipment they are operating**,** in accordance with manufacturers' guidance and the operator's manual.

**Topic 3.3**
Learners will safely prepare raw materials to given specifications in preparation for subsequent conversion into timber products (e.g. cross-cutting of timber at conversion point to meet size specifications, safely stacking timber in preparation for processing).

**Topic 3.4**
As a minimum, it is expected that learners will be able to operate three different types of processing and conversion equipment to produce three different products. Learners will safely operate processing and conversion equipment to produce timber products to given specifications and quality requirements. They will consider the following:

- safe start, stop, and operation of equipment
- monitoring of machine performance and output within production tolerances
- effective communications
- awareness of hazards, public and work colleagues
- clearance of blockages
- conversion between work and transport positions
- use of traction aids
- cleaning and inspection of equipment for defects.

Learners will comply with risk assessment requirements (e.g. use of lifting aids), industry best practice and the operator's manual appropriate to the processing and conversion equipment they are operating. The resulting products will meet the set specifications (size, quality, uniformity) established for the products to be suitable for markets.

## Learning outcome

**4. Understand timber utilisation and the wood preservation process**

## Topics

4.1 Factors that influence timber utilisation
4.2 Commonly used wood preservation types and processes
4.3 Marketing of timber products

In this outcome, learners will evaluate the factors which influence timber utilisation. This should include the use of wood preservatives, and how timber products can be effectively marketed. Emphasis should be placed on current preservation technology and approved chemicals. It is essential to include new marketing innovations and developments as they arise in the marketplace.

**Topic 4.1**
Learners will understand the factors that influence timber utilisation, to include

- wood characteristics
  - natural durability,
  - sapwood/heartwood ratio,
  - ease of preservative penetration,
  - acoustic properties,
  - dimensional stability,
  - strength,

- proportion of knots,
- chemical composition

- processing and conversion
  - application of wood preservatives,
  - cutting patterns (i.e. quarter, radial or plain sawn).
- economic considerations
  - market characteristics and demand,
  - transport to buyer,
  - current prices,
  - competition

**Topic 4.2**
Learners will understand the common types of wood preservatives (e.g. oil-borne, water-borne, organic solvent, epoxy sealers) and application or processing methods (e.g. brushing, immersion, spraying, pressure/ vacuum process, chemical modification).
Learners should compare different wood preservation options and their suitability for the end use In addition, learners should also be aware of the environmental and economic considerations associated with the common preservation options.

**Topic 4.3**
Learners will evaluate how timber products are commonly marketed to the target customer and end user. This should include consideration of marketing media (e.g. internet marketing, local and national press, specialist press), sale methods (e.g. direct sales, auction and tender), unique selling points and pricing strategies.

## Guidance for delivery

This unit is designed to provide the learner with the knowledge and skills associated with timber processing and conversion, and knowledge of how timber products are marketed and subsequently used. The unit should cover as wide a range of processing and conversion equipment as possible available to the learner.

Throughout the unit, the emphasis should be on safe working and industry best practice.

A learner working towards level 3 is likely to have experience of machinery operation and knowledge of tree structure and biology. This unit aims to extend the learners' knowledge and skills associated with the 'downstream' processing industries and factors that influence how timber is used by society. Emphasis should be placed not only on 'doing', but also upon the importance of understanding the product characteristics required within the marketplace. The learner should understand the importance of maintaining an awareness of current legislation and codes of practice in relation to equipment maintenance and operation.

Centres are encouraged to introduce employers and industry professionals to provide interesting and relevant information to the learner. Visits to a variety of working sites and trade shows would add depth to the learner's experience by exposing them to processing and conversion equipment in operation.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are linked directly with interactive practical lessons in a real environment. The learner must be given the opportunity to work with a range of processing and conversion equipment in different situations which reflects current industry practice.

## Suggested learning resources

**Books**

Health and Safety Executive. 2012. *Health and Safety in Sawmilling*. *2nd Edition*. London: HSE Books. ISBN 0717664929.

Aaron, J., Richards, E.G. 1990. *British Woodland Produce.* Carmarthenshire: Stobart Davies Limited. ISBN 0854420479.

Shmulsky, R. and Jones P.D. 2011. *Forest Products and Wood Science: An Introduction*. *6th Edition*. Wiley-Blackwell. ISBN 081382074X.

Desch, H.E., Dinwoodie, J.M. 1996. *Timber: Structure, Properties, Conversion and Use*. Hampshire: Palgrave Macmillan. ISBN 0333609050.

Dinwoodie J.M. 2000. *Timber: Its Nature and Behaviour. 2nd Edition*. CRC Press. ISBN 0419235809.

Hathaway, L. 2008. *Tractors: Fundamentals of Machine Operation*. Davenport: John Deere Publishing. ISBN 0866912126.

Hoadley, R.B. 2000. *Understanding Wood: A Craftsman's Guide to Wood Technology*. 2nd Edition. Newtown: Taunton Press. ISBN 1561583588.

Smithies, J.N. 1991. *Sawmilling Accuracy for Bandsaws Cutting British Softwoods*. Norwich: Stationary Office Books. ISBN 0117102954.

Walker, J.C.F. 2006. *Primary Wood Processing: Principles and Practice*. 2nd Edition. London: Springer Publishers. ISBN 1402043929.

**Journals and magazines**

Forestry Journal

Timber Trades Journal

Forest Industry Safety Accord (FISA) Safety Guides

Arborist News

Essential Arb

Journal of Arboriculture

Quarterly Journal of Forestry

The Arb Magazine

**Websites**

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|---|---|
| The Arboricultural Association | http://www.trees.org.uk/ |
| The Forest Industry Safety Accord | http://www.ukfisa.com/ |
| The Forestry Commission | http://www.gorestry.gov.uk/ |
| The Timber Research and Development Association | http://www.trada.co.uk/ |
| Health and Safety Executive | http://www.hse.gov.uk |

# Unit 360 Measure trees and carry out woodland sampling

| | |
|---|---|
| **UAN:** | |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of the measuring of trees and woodlands and how these can be put into practice. The learner will understand common mensuration conventions and be able to measure key tree and woodland parameters. Learners will develop skills in the measurement of felled and standing timber and be able to produce sampling schemes, as well as survey and map woodlands.

## Learning outcomes

In this unit, learners will be able to

1. Measure trees
2. Measure volume of felled timber and standing trees
3. Sample woodlands

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Measure trees**

### Topics

1.1 Reasons for measuring trees
1.2 Mensuration conventions
1.3 Individual tree parameters and their measurement
1.4 Stand parameters and their measurement

In this outcome, learners should initially develop their skills on single trees in a flat open situation before dealing with more complex situations. It would be beneficial to include learning within the wider context, such as the importance of obtaining accurate measurements for management purposes, such as thinning control and growth studies.

**Topic 1.1**
Learners will understand the reasons for measuring trees and woodlands, e.g. to assess harvestable volume, valuation to compile and maintain an inventory, to describe the area distribution by species, age class, stocking and yield class, land use type and any selective systems for continuous sustainable yield.

**Topic 1.2**
Learners will understand the mensuration conventions used within the forestry industry. This should include: record keeping, over-bark and under-bark measurements, Diameter at Breast Height (DBH), diameter classes, diameter limits, forked trees, leaning trees, trees on slopes, deformed trees, coppiced stools, rounding down and accuracy and precision.

**Topic 1.3**
Learners will develop an understanding of a range of individual tree parameters, and will be able to accurately measure these parameters practically. Individual tree parameters should include:

- stem diameter (DBH)
- basal area
- height (total height, form height and timber height).

**Topic 1.4**
Learners will develop an understanding of a range of stand tree parameters, and will be able to accurately measure these parameters practically, stand parameters should include:

- stocking density
- stand basal area
- top height

**Topic 1.3 and 1.4**
Learners should also understand the importance of accuracy of measurement and recording, be able to select appropriate measuring equipment (girth tapes, callipers, measuring tapes, clinometers, relascopes), and demonstrate an awareness of safety considerations (slips, trips, lone working).

## Learning outcome

**2. Measure volume of felled timber and standing trees**

## Topics

2.1 Measure volume of felled timber

2.2 Measure volume of individual trees

2.3 Measure volume of forest stands

In this outcome learners will be introduced to a range of methods and given the opportunity to consider their advantages and limitations. It is not expected that the learner should remember a range of formulae. It would be beneficial to include learning within the wider context of measuring timber, for example comparing buying and selling timber based on volume estimates against weight sales.

**Topic 2.1**

Learners will understand how felled timber can be measured, and should be able to obtain accurate measurements practically. This should include:

- measurement of log volume (Huber's formula)
- measurement of timber stack volume
- volume assortment tables
- metric measurements

**Topic 2.2**

Learners will understand how individual trees can be measured, and should be able to obtain accurate measurements practically. This should include:

- volume by sectional measurement
- single tree tariff charts
- metric measurements

Learners should be aware of use the Hoppus Cubic Foot as a volume measure in the hardwood trade, but are not required to use it.

**Topic 2.3**

Learners will understand how forest stands can be measured, and should be able to obtain accurate measurements practically. This should include:

- tariff system
- metric measurements

**Topic 2.1, 2.2, 2.3**

Learners should also understand the importance of accuracy of measurement and recording, be able to select appropriate measuring equipment (girth tapes, callipers, measuring tapes, clinometers), and demonstrate an awareness of safety considerations (slips, trips, lone working)

## Learning outcome

**3. Sample woodlands**

## Topics

3.1 Sampling methods and units
3.2 The influence of woodland structure on sampling scheme
3.3 Produce a sampling scheme
3.4 Carry out woodland sampling
3.5 Select and mark trees for felling
3.6 Reasons for and impact of removing trees

In this outcome learners should be introduced to the characteristics used to select trees for removal. Marking can include the use of paint and timber scribes. However, invasive marking methods involving the wounding of standing trees should not be undertaken unless the trees are to be subsequently felled.

**Topic 3.1**

Learners will understand sampling methods, including: systematic sampling, simple random sampling and stratified random sampling. Learners will understand how to choose sampling units (point, transect and plot), plot size, and plot shape. Sources of bias should also be considered.

**Topic 3.2**

Learners will understand how woodland structure affects the sampling method, unit and intensity.

**Topic 3.3**

Learners will produce a sampling scheme, including: sampling method, sampling unit, sampling intensity and location of sampling units.

**Topic 3.4**

Learners will adhere to a sampling scheme. Learners will understand the importance of accuracy of measurement and recording, be able to select appropriate measuring equipment (girth tapes, callipers, measuring tapes, clinometers), and demonstrate an awareness of safety considerations (slips, trips, lone working).

**Topic 3.5**

Learners will select and mark trees during thinning practices. Learners will select: dead, dying, diseased, deformed, abnormal/'wolf' trees. They will also mark trees for removal using bio-degradable tape, paint, timber scribes or by blazing with slashers.

**Topic 3.6**

Learners will understand the reasons for and impact of removing trees.

## Guidance for delivery

This unit is designed to provide the learner with knowledge and skills required to measure and map trees and woodlands accurately. The unit will also allow the learner to understand the advantages and limitations of the methods commonly used by the industry and to select the most appropriate methods according to the objectives.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. It is expected that the learner will be given the opportunity to practice as wide a range of measurement techniques as possible on a range of different trees and woodland situations. Due to the natural variability of woodland sites, the learner should initially develop their skills on single species contiguous stands, before attempting to sample mixed or uneven aged stands.

A learner working towards level 3 is likely to have experience of a diverse range of trees and woodlands. Emphasis should be placed not only on 'doing', but also upon the importance of obtaining accurate information for a range of woodland management purposes. It is important that the learner is able to access a range of mensuration, surveying and mapping equipment.

Centres are encouraged to introduce employers and specific professionals from the forestry and arboriculture industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of woodland situations to add depth to the learner experience.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are they are linked directly with interactive lessons in a real environment. The learner will be given the opportunity to deal with a range of trees and woodlands.

## 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 0471018503

Lillesand T, Kiefer R and Chipman J. 2003. *Remote Sensing and Image Interpretation* John Wiley and Sons. ISBN 0471451525

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

Rollinson T. 1988. *Thinning Control.* Forestry Commission. ISBN 0117102563

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


Best Practice Guidance including Forest Industry Safety Accord (FISA) and Arboriculture and Forestry Advisory Group (AFAG)

**Journals and magazines**

Quarterly Journal of Forestry

Forestry

Forestry and British Timber

Arboricultural Association magazine/journal

### Websites

| | |
|---|---|
| www.charteredforesters.org | Institute of charted foresters |
| www.trees.org.uk | Arboricultural Association |
| www.rfs .org.uk | Royal Forestry Society |

# Unit 361 Operate, maintain and understand the principles of specialist forestry and arboricultural machinery

| | |
|---|---|
| UAN: | |
| Level: | 3 |
| GLH: | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of specialist forestry or arboricultural machinery and how this can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will develop an understanding of the importance of specialised forestry or arboricultural machinery and the significance within the industries. They will be able to maintain and operate specialist forestry or arboricultural machinery to meet given objectives. The learner will also understand the operating principles of machinery and how the machinery has developed to meet industry requirements.

## Learning outcomes

In this unit, learners will be able to:

1. Understand the importance of specialised machinery for forestry or arboriculture
2. Maintain specialised forestry or arboricultural machinery
3. Operate specialised forestry or arboricultural machinery.

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand the importance of specialised machinery for forestry or arboriculture**

### Topics

1.1 Specialist machinery for forestry or arboricultural applications
1.2 Select appropriate machinery to undertake forestry or arboricultural tasks
1.3 The importance of specialist forestry or arboricultural machinery to the industries
1.4 Importance of keeping accurate and up-to-date records

In this outcome learners should be encouraged to obtain and review manufacturers' information.

**Topic 1.1**
Learners will understand the range and application of specialist forestry or arboricultural machinery.
Machinery should include mounted, self-propelled and pedestrian operated machinery:

- Forestry: land clearance and preparation (excavators, scarifiers, mulchers, ditchers, planters), felling (chainsaws, winches, harvesters), forwarding (line skidders, grapple skidders, clambunk skidders, forwarders, cable cranes), processing (stroke and bed processors, peelerpointers, sawbenches) waste removal (brushwood chippers) log splitters and firewood processors.

- Arboricultural: land clearance and preparation, waste removal (stump grinders, brushwood chippers), planting (tree spades, planters), felling (chainsaws, winches), tree works (mobile elevating work platforms, top handle chainsaws, lowering equipment, cranes) soil amelioration machinery (air-spade and terravent soil decompactor

**Topic 1.2**
Learners will understand the criteria commonly considered when selecting machinery for their chosen industry, to include:

- 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

**Topic 1.3**
Learners will understand the importance of specialist machinery to their chosen industry, to include:

- reduced labour cost
- improved economic efficiency,
- engineering control as part of a risk assessment
- improved ergonomics and safety

**Topic 1.4**
Learners will understand the importance of systematic record keeping, to include:

- requirement under current legislation
- stock records,
- machinery service intervals,
- insurance requirements,
- business analysis

## Learning outcome

**2. Maintain specialised forestry or arboricultural machinery**

## Topics

2.1 The importance of routine and non-routine maintenance
2.2 Identify common faults and suggest appropriate remedial action
2.3 Perform routine servicing and maintenance

In this outcome the learner will be required to maintain and service specialised machinery appropriate to their area of study. It is expected that the learner will be given access to appropriate workshop facilities and tools to maintain and service the machinery. It is essential that the manufacturers' manuals are available to undertake this work. As a minimum, it is expected that the learner will be able to service and maintain three specialist machines appropriate to their area of study in a realistic industrial environment where possible.

**Topic 2.1**
Learners will understand the importance of routine and non-routine machinery maintenance, to include:

- recognition of incorrect operation
- legal requirements
- maintaining efficient operation
- reducing breakdowns
- cost implications
- effect of poorly maintained machinery on operators
- machine warranty

**Topic 2.2**
Learners will identify common faults and suggest appropriate remedial action appropriate to the machinery available to them. Common faults could include:

- incorrect, polluted or lack of fuel
- blocked filters (air, fuel, oils)
- poor oil pressure
- damaged sprockets and fouled drive systems
- damaged or dull cutters
- fouled spark plugs
- bad earth connection
- blocked mechanisms

Remedial action should be in accordance with manufacturers' or suppliers' guidance and operator's manual

**Topic 2.3**
Learners will perform routine servicing and maintenance of machinery available to them, to include appropriate replacement or adjustment of operator serviceable components (e.g. blades, anvils, cutting teeth, bearings, tyres, filters, greasing, traction aids) in accordance with manufacturers' or suppliers' guidance and operator's manual. Learners will keep accurate maintenance records.

## Learning outcome

**3. Operate specialised forestry or arboricultural machinery**

## Topics

3.1 Current legislation and industry guidance for forestry or arboricultural machinery operation
3.2 How to minimise possible environmental impacts of using specialist forestry or arboricultural machinery
3.3 Carry out risk assessments
3.4 Perform pre-start checks and adjustments as per manufacturers' recommendations
3.5 Operate specialised forestry or arboricultural machinery safely and effectively to meet given objectives

In this outcome, the learner will be required to operate specialised machinery appropriate to their area of study. It is anticipated that the delivery of this outcome will be delivered through supervised practical training and the learner able to consolidate operational skills within realistic working environments. As a minimum, it is expected that the learner will be able to operate three specialist machines appropriate to their area of study in a realistic industrial environment where possible. The learner should be given appropriate time in order to develop operational skills before assessment. The learner is not required to transport machinery, but should be aware of transport requirements.

**Topic 3.1**
Learners will understand the significance of current legislation and industry best practice guidance to the machinery they operate. To include:

- Legislation: Provision and Use of Work Equipment Regulations 1998 (PUWER), Lifting Operations and Lifting Equipment Regulations 1998 (LOLER), Health and Safety at Work Act 1974, Management of Health and Safety at Work Regulations 1999, Control of Substances Hazardous to Health Regulations 2002 (COSHH), Manual Handling Operations Regulations 1992, Personal Protective Equipment (PPE) at Work Regulations 1992, Environmental Protection Act 1990, Wildlife and Countryside Act 1981
- Industry best practice guidance: Arboriculture and Forestry Advisory Group (AFAG) Safety Guides, Health and Safety Executive Information Sheets, Forest Industry Safety Accord (FISA)

**Topic 3.2**
Learners will understand how to minimise possible environmental impacts of specialist forestry of arboricultural machinery, to include:

- awareness of requirements under control of pollution legislation
- oil and fuel spillage and storage
- emissions
- soil stability and erosion
- soil compaction
- tree root damage
- protected species

- waste disposal
- watercourses
- archaeology
- brash matting

**Topic 3.3**
Learners will be able to carry out risk assessments for the machines they are to operate in accordance with The Management of Health and Safety at Work Regulations 1999

**Topic 3.4**
Learners will perform pre-start checks and adjustments in accordance with manufacturers' guidance and operator's manual

**Topic 3.5**
Learners will demonstrate safe and efficient operation of specialist forestry or arboricultural machinery, to include (as appropriate):

- adherence to industry safety guidance and operator's manual
- safe start and stop
- monitoring or machine performance and output
- effective communications
- awareness of hazards
- clearance of blockages
- awareness of public and work colleagues
- conversion between work and transport positions
- economic operation
- adherence to specifications
- use of traction aids
- safe and efficient operation
- cleaning and inspection of machine for defects after use

## Guidance for delivery

This unit is designed to provide the learner with the knowledge of the diversity and range of machinery available and the skills required to maintain and operate specialised machinery appropriate to the area of study. The unit should cover as wide a range of machinery as possible, appropriate to the area of study as well as those locally or regionally significant to the learner.

Throughout the unit, the emphasis should be on safe working. It is a requirement for the learner to operate machinery therefore health and safety issues relevant to the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessment. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

Centres are encouraged to introduce employers and specific professionals from the forestry or arboriculture industry, such as specialised machinery suppliers and dealers, or machinery operators to provide interesting and relevant information to the learner. Learners would also benefit from visits t a

variety of working sites and trade shows to add depth to the learning experience by studying machinery in operation.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are linked directly with interactive practical lessons in a real environment. The learner must be given the opportunity to work with a range of machinery in different situations which reflects current industry practice. It is anticipated that the range of machinery may include equipment adapted from the construction or agricultural industries as well as purpose built equipment.

## Suggested learning resources

**Books**

Arboricultural Association. 2005. *Arboricultural Association Health and Safety Package*. Cheltenham: Arboricultural Association. ISBN 0900978406.

Arboricultural Association. 2008. *A Guide to the Use of MEWPs in Arboriculture.* ISBN 9780900978449

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.

Kestel, B. 2009. *Chainsaw Operator's Manual: The Safe Use of Chainsaws.* Australia: Landlinks Press. ISBN 0643090282.

Shetterly, R., Blair, D.F. 1995. Arborist Equipment: A Guide to the Tools and Equipment of Tree Maintenance and Removal. Canada: International Society of Arboriculture. ISBN 188195613X.

Southorn, N. 1999. *Tractor Operation and Maintenance*. Sydney: Inkata Press. ISBN 0750689145.

Williams, M. 2000. *Tractor Power.* Ipswich: Farming Press. ISBN 0852365144.

RR123: Use and Effectiveness of MEWPs in Arboriculture HSE

RR668: Evaluation of current rigging and dismantling practices used in arboriculture HSE

**Journals and magazines**

Arboricultural Association newsletter

Forestry and British Timber

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Forest Industry Safety Accord (FISA) Safety Guides

**Websites**

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| The Arboricultural Association | http://www.trees.org.uk/ |
| The Forest Industry Safety Accord | http://www.ukfisa.com/ |
| The Forestry Commission | http://www.gorestry.gov.uk/ |
| Health and Safety Executive | http://www.hse.gov.uk |

# Unit 362 Support arboricultural operations from the ground

| | |
|---|---|
| **UAN:** | J/507/4653 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with the knowledge and skills to support arboricultural operations. Responsibility for work site management and organisation will be a central part of this unit. The learners will support arboricultural operations from the ground, select and assist climbers in the use of appropriate equipment to undertake a range of preventative and remedial operations. In addition, the learner will support advanced climbing operations and control cut sections with rigging equipment.

## Learning outcomes

In this unit, learners will:

1. Set up and manage a safe work site
2. Support tree climbing operations from the ground
3. Assist aerial rescue techniques
4. Understand the legal and safety implications of tree climbing operations

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Set up and manage a work site**

### Topics

1.1 Carry out a risk assessment

1.2 Create and maintain a safe work site.

1.3 Work with climbing staff to achieve a safe working environment

1.4 Dispose of arisings in accordance with safe working practices and environmental considerations

In this outcome the learners will set up and manage a work site, taking responsibility for site safety and organisation. They will work with the climber to maintain a safe working environment and dispose of arisings appropriately. It is anticipated that this outcome will be delivered through supervised practical sessions that encourage the learner to consolidate operational skills within realistic working environments.

**Topic 1.1**

The learners will carry out risk assessments suggesting control measures with close attention to the following points:

- site and ground conditions, weather conditions, tree condition (VTA of all areas of the tree, fungal fruit bodies, wildlife)
- operator, machine and task
- public access and rights of way/highways
- above and below ground utilities
- noise levels
- risk control and reduction
- establishment of safety zones
- emergency procedures
- rescue equipment
- first aid provision
- refuelling site,
- Personal Protective Equipment (PPE)
- Safety Guides (Arboriculture and Forestry Advisory Group (AFAG), Forest Industry Safety Accord (FISA)

**Topic 1.2**

The learner will create and maintain a safe work site through the following work practices:

- set out appropriate signage for the site
- select and gather appropriate equipment for the task
- identify a suitable re-fuelling area.
- set out vehicles, machinery and equipment to allow a safe and efficient work process.
- identify the drop zone and keep it clear of debris throughout the task.
- maintain effective communications with the climber

**Topic 1.3**

The learner will work with climbing staff to achieve a safe working environment through the following methods:

- communicate with climbing staff
- use effective communication systems
- maintain continuous awareness of hazards
- maintain a clear and safe drop zone (foot traffic, debris, rope management)
- have appropriate rescue equipment available

**Topic 1.4**

The learner will dispose of arisings while adhering to safe working practices using any of the following methods:

- stack as habitat piles
- dead hedging
- chipping
- burning
- coppice cover

An awareness of environmental considerations relevant to the disposal of arisings will also be demonstrated:

- Environment Protection Act 1990
- Environmental Protection (Duty of Care) Regulations 1991
- Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991
- Waste Management Licensing Regulations 1994
- Register with Environment Agency (or equivalent)
- Waste Transfer Notes (WTNs) and record keeping

## Learning outcome

**2. Support tree climbing operations from the ground**

## Topics

2.1 Support tree inspection operations from the ground
2.2 Support tree pruning and removal operations from the ground
2.3 Select a suitable base anchor and install rigging equipment
2.4 Lower cut sections from the ground in a controlled manner

In this outcome the learner will support a variety of tree climbing operations. They will aid the climber in aerial inspections, tree pruning and will use rigging equipment from the ground to control severed sections. It is anticipated that this outcome will be delivered through supervised practical sessions that allow the learner able to consolidate operational skills within realistic working environments.

**Topic 2.1**

The learner will assist aerial tree inspection and operations from the ground using the following methods:

- effective communication
- safely provide climber with equipment
- maintain an awareness of hazards

- minimise environmental impact
- record data as required

**Topic 2.2**

The learner will assist tree pruning operations from the ground using the following methods:

- set up and safely manage the site
- effective communication systems
- guide the climber when pruning
- safe refuelling of equipment
- safely provide climber with equipment
- maintain an awareness of hazards
- appropriate disposal of arisings
- prevention of pollution
- minimise environmental impact

**Topic 2.3**

Learners will select a suitable base anchor and install a friction device for dismantling trees. These could include:

- Rigging equipment: friction bollards / capstans,
- whoopey slings, lowering ropes,
- multi slings
- slings / strops
- pulley
- steel karabiners
- tie, set and dress appropriate rigging knots: eg timber hitch, cow hitch, running bowline, Munter's hitch

**Topic 2.4**

Learners will control removal of branches and vertical sections of the stem with rigging equipment from the ground, whilst demonstrating the following:

- use of rigging equipment under the direction of the climber
- safely provide climber with equipment
- effective communications with the climber
- lower and control cut sections from the ground (tag lines, pull lines)
- safe and efficient chainsaw operation
- awareness of hazard zones and escape routes
- safe working distances

## Learning outcome

**3. Assist aerial rescue techniques**

## Topics

3.1 Understand aerial rescue procedures in a variety of situations

3.2 Select appropriate aerial rescue equipment

3.3 Assist in the aerial rescue process

3.4 Manage the aftermath of an aerial rescue.

In this outcome the learner will assist aerial various rescue techniques. It is anticipated that this outcome will be delivered through supervised practical sessions that encourage the learner to consolidate operational skills within realistic working environments. The learner should be provided with appropriate equipment to undertake this outcome and have received sufficient preparatory training in the safe use of lowering equipment. The learner should not work under hazardous trees or work on sites where the level of risk is deemed to be unacceptable.

**Topic 3.1**

The learner will understand aerial rescue procedures in a variety of situations. To include:

- two person rescue (type a, type b)
- two person rescue (pole)
- three person rescue
- organisation of ground staff
- planning the rescue
- roles and responsibilities during an aerial rescue
- managing the aftermath of an aerial rescue

**Topic 3.2**

The learner will select appropriate aerial rescue equipment; this could include:

- climbing equipment: ropes, harnesses, karabiners, strops, slings, throwlines, rope grabs, cambium savers and pulleys
- tie, set and dress climbing knots: perfection loop, bowline, figure-of-eight
- tie, set and dress friction hitches: eg prussik, klemheist
- aerial rescue equipment
- tie, set and dress appropriate knots: eg timber hitch, cow hitch, running bowline, Munter's hitch

**Topic 3.3**

The learner will assist in the aerial rescue process. They will:

- assess situation and make safe
- communicate with other operatives to plan the rescue
- prepare first aid kit
- assist an aerial rescue as appropriate
- have an awareness of hazards
- maintain constant communication with casualty and climber / rescuer

**Topic 3.4**

The learner will know how to manage the aftermath of an aerial rescue:

- quarantine the site
- replenish first aid kit
- complete accident book
- report to RIDDOR if necessary
- update the risk assessment

## Learning outcome

4. Understand the legal and safety implications of arboricultural operations

## Topics

4.1 The legal and safety implications associated with tree pruning and dismantling

In this outcome the learner will explore the legal and safety implications of aerial arboricultural work. These sessions should allow the learner to consolidate knowledge within realistic working environments. They should also appreciate the importance of maintaining an awareness of current legislation and codes of practice which may relate to arboricultural operations.

**Topic 4.1**

The learners will know current codes of practice and legislation appropriate to aerial tree works including:

- Health and Safety at Work Act 1974
- Wildlife and Countryside Act (1981) (as amended)
- Conservation of Habitats and Species Regulations 2010
- Management of Health and Safety at Work Regulations 1992 (as amended)
- Personal Protective Equipment (PPE) Regulations (1992)
- Provision and Use of Work Equipment Regulations 1998 (PUWER)
- Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)
- Countryside and Rights of Way Act 2000
- Health and Safety (First Aid) Regulations 1981
- Work at Height Regulations 2007
- Town and Country Planning (Tree preservation) (England) Regulations 2012

# Guidance for delivery

This unit should be undertaken by learners who need to support tree climbing operation taught in Unit 308 & 326. It is designed to provide the learner with knowledge and the skills required to safely support advanced arboricultural operations. A learner working towards level 3 is likely to have experience of practical arboricultural activities. This unit aims to develop the learner's knowledge and skills involved with the safe use of chainsaws, and the support of tree climbing operations. Emphasis should be placed upon 'doing' but it is important that the learner understands the importance of maintaining an awareness of current legislation and codes of practice in relation to tree climbing and related operations.

It is accepted that formal lectures are necessary at level 3 but for this unit it is recommended that they are they are linked directly with interactive practical lessons in a real working environment. The learner should be given the opportunity to support and undertake a range of arboricultural operations on different sites and situations which reflects current industry practice.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner will be aware of safe working practices in chainsaw and aerial tree work, as well as being familiar with accepted practices and behaviours within the context in which they are working. Health and safety issues relevant to the operation of the machinery used and aerial tree work must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

Any legal permission required to prune or fell trees must be obtained and equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998 and Lifting operations and Lifting Equipment Regulations 1998 (LOLER).

Adequate Personal Protective Equipment (PPE) appropriate to the learner, the equipment and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

Learners should be given access to appropriate climbing, rescue and lowering equipment to undertake this unit and receive sufficient preparatory training in the safe use of this equipment. Learners should also be given the opportunity to support a range of pruning and dismantling work in realistic working environments but must not be required to work on hazardous trees or work sites where the level of risk is deemed to be unacceptable.

## Suggested learning resources

**Books**

*Anon. 2010. BS 3998: Recommendations for Tree Work*. British Standards Institute. ISBN 978 0 580 53777 6

Anon. 2005. *A Guide to Good Climbing Practice*. Arboricultural Association. ISBN 0900978392

Anon. 2008. *A Guide to the Use of MEWPs in Arboriculture*. Arboricultural Association. ISBN 0900978449

Brown G and Kirkham T. 2004. *The Pruning of Trees, Shrubs and Conifers*. Timber Press. ISBN 0881926132

Cowell, Detter etal. 2008. (RR668) Evaluation of current rigging and dismantling practices used in arboriculture. HSE

Cowan A. 2003. *Trees and Bats*. Arboricultural Association. ISBN 0900978376

Donzelli PS and Lilly SJ. 2001. *The Art and Science of Practical Rigging*. International Society of Arborists.

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

Ireland D. 2004. *Winching Operations in Forestry*. The Stationary Office Books. ISBN 085538638X

Jepson J. 2000. *The Tree Climber's Companion*. Access publishing Inc. ISBN 0615112900

Kestel B. 2005. *Chainsaw Operator's Manual: The Safe Use of Chainsaws*. Landlinks Press. ISBN 0643090282

Lingens D. 2006. *Tree Climber's Knotbook*. Schlauverlag.

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

Mynors C. 2002. *The Law of Trees, Forests and Hedgerows.* Sweet and Maxwell. ISBN 0421590408

Shigo AL. 1989. *Tree Pruning: A Worldwide Photo Guide*. Shigo and Trees Associates. ISBN 0943563089

**Journals, magazines and guides**

Arboricultural Advisory Information Service publications

Arboricultural Association newsletter

Journal of Arboriculture

NPTC workbooks 2007 / 2013 / 2108

AFAG guides

FISA guides

Husqvarna workbooks

**Websites**

http://www.climbingarborist.com/
http://www.hse.gov.uk/treework/safety-topics/climbing-operations.htm
http://treeclimbing.com/index.php/climbing/technique

# Unit 363 Forest and woodland skills

| | |
|---|---|
| UAN: | |
| Level: | 3 |
| GLH: | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of forest and woodland skills and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will be able to develop and undertake common practical skills in a range of forest and woodland settings. Specifically, be able to plant trees and manage competing vegetation, maintain drainage systems as well as erect and maintain fencing. The learner will also develop an understanding of the need to undertake these common activities and their importance for successful forest and woodland management.

## Learning outcomes

In this unit, learners will be able to:

1. Understand forest and woodland skills
2. Control unwanted growth and vegetation in forests and woodlands
3. Maintain an open drainage system within a forest or woodland
4. Construct forest and woodland fencing
5. Set out and plant forest and woodland trees

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

## Learning outcome

**1. Understand forest and woodland skills**

## Topics

1.1 Tree planting methods and categories of planting stock
1.2 Removing and controlling unwanted and competing growth and vegetation
1.3 Establishing and maintaining open drainage systems
1.4 Forest and woodland fencing

**Topic 1.1**

Learners will understand the different stock types and methods of planting used in forests and woodlands to include:

- stock types:
  - bare-root
  - cell grown
  - transplants
  - cuttings
  - seedlings
  - undercut
- methods of planting:
  - notch
  - spear
  - mechanised

**Topic 1.2**

Learners will understand the importance of removal and control of unwanted vegetation from and around trees.

- removal of unwanted vegetation:
  - reduce competition (space, nutrients, light)
  - influence characteristics of final crop
  - financial considerations
  - fire control
- reasons for brashing and pruning:
  - access
  - fire control
  - formative
  - financial
  - amenity
  - timber quality

**Topic 1.3**

Learners will understand the importance of good drainage in forests and woodlands. They will consider:

- minimum soil erosion
- good soil aeration
- good tree establishment and growth
- prevention of water logging
- prevention of wind throw

**Topic 1.4**

Learners will understand the different types of fencing used in woodlands and forests and their appropriate application.

- fencing types to include:
  - deer
  - rabbit
  - post and rail
  - stock
- applications to include:
  - shelter
  - security
  - exclude public and control access
  - protection from grazing and livestock damage/ contain livestock
  - amenity and landscape value,
  - boundary demarcation

## Learning outcome

**2. Control unwanted growth and vegetation in forests and woodlands**

## Topics

2.1 Remove unwanted vegetation around trees
2.2 Brash and prune trees
2.3 Select trees for removal from stands for thinning

In this outcome the learners will be required to remove and control unwanted growth and vegetation. The type of vegetation and growth will vary according to the forest sites available, therefore the learner will remove and control at least two different types of vegetation, using appropriate methods.

**Topic 2.1 and 2.2**

Learners will demonstrate the safe and efficient removal of unwanted vegetation on and around trees. Learners will ensure they:

- select appropriate methods
- apply correct working techniques and operation of equipment
- use appropriate Personal Protective Equipment (PPE)
- appropriately dispose of waste

- prevent pollution
- minimise environmental impact

**Topic 2.3**

Learners will select trees suitable for removal as part of standard thinning operations. Learners will take the following into consideration:

- reasons for removal (access, financial, amenity, timber quality),
- thinning types (systematic, selective, positive, negative, crown, low, intermediate)
- tree class (dominant, co-dominant, sub-dominant, suppressed, wolf, whips, dead and dying)

## Learning outcome

**3. Maintain an open drainage system within a forest or woodland**

## Topics

3.1 Identify drainage problems

3.2 Maintain an open drainage system

In this outcome the learner will be required to maintain an open drainage system. The type of drainage maintenance required will vary according to the forest sites available. It is expected that the learner will use manual methods to maintain the drainage system.

**Topic 3.1**

Learners will identify drainage problems including

- blocked or obstructed drain
- waterlogging
- inappropriate route, profile, or depth

**Topic 3.2**

Learners will perform maintenance on an open drain within a forest or woodland. Learners will be expected to:

- work to specification (route, profile, depth, grade, flow rate)
- select appropriate methods
- re-cut banks
- clear debris
- apply correct working techniques and operation of equipment
- use appropriate Personal Protective Equipment (PPE)
- appropriately dispose of waste
- prevent pollution
- minimise environmental impact

## Learning outcome

**4. Construct forest and woodland fencing**

## Topics

4.1 Plan, specify and estimate forest fencing

4.2 Construct forest fencing

4.3 Inspect forest fencing and recommend repair

In this outcome the learners will be able to construct forest fencing. The range of fencing options may vary according to the forest sites available and associated specifications, but the learner should construct at least two types of fence.

**Topic 4.1**

Learners will plan, specify and estimate fencing types as identified in Topic 1.4, to include:

- plan operation (site survey, access points, route)
- create specification (materials, fencing type)
- estimate quantity and cost of materials

**Topic 4.2**

Learners will construct two types of forest and woodland fencing as identified in 1.4.

- work to specification
- select and correctly use appropriate equipment (eg wire tensioners, hammers, post hole borers, wire cutters, PPE)

**Topic 4.3**

Learners will inspect an existing fence for damage and make recommendations for repair.

## Learning outcome

**5. Set out and plant forest and woodland trees**

## Topics

5.1 Prepare sites for tree planting

5.2 Handle, store, transport and distribute planting stock

5.3 Plant trees according to specifications

In this outcome the learners will be required to set out and plant trees. The range of planting stock may vary according to the planting site and associated specification. In addition, current and topical issues regarding tree selection should be highlighted as and when they arise.

**Topic 5.1**

Learners will demonstrate appropriate preparation of the immediate site for tree planting (eg removing brash, screefing, inverting turf)

**Topic 5.2**

Learners will demonstrate transporting, handling and distribution of stock in accordance with the Horticultural Trade Association (HTA) requirements. Learners will be expected to:

- check stock against order specification,
- handle, transport and store stock correctly (heeling in, cold storage, straw clamps, sheeting, coextruded bags),
- distribute according to planting plan

**Topic 5.3**
Learners will be able to set out and plant trees in forests or woodlands to given specifications. They will be expected to:

- set out ranging poles for planting lines
- plant to correct spacing and density
- apply correct planting method and working techniques
- ensure planting quality to promote establishment

## Guidance for delivery

This unit is designed to provide the learner with the knowledge and skills required to undertake a range of core forestry activities. The unit should cover as wide a range as possible including fencing, planting vegetation maintenance and drainage operations, to enable the learner to adapt and apply their skills and knowledge to the range of forest and woodland types they may encounter, but focus on methods locally or regionally significant to the learner.

Throughout the unit, the emphasis should be on safe working and good environmental practices. It is expected that the learner will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for learners to operate machinery therefore, health and safety issues relevant to the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessment. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual. It is not a requirement for the learner to use pesticides or other approved chemical methods of vegetation management. Simulation and demonstration could be used to illustrate appropriate methods and equipment which are commonly used, but are unavailable to the learner.

A learner working towards level 3 may or may not have experience of practical forestry activities. This unit aims to broaden the learner's knowledge and skills involved with the successful establishment and maintenance of healthy forests and woodlands. Emphasis should be placed not only on 'doing', but also upon the importance of planning and strategies to ensure safe, efficient and effective operations. The will encourage the learners to develop an awareness of the commercial and financial implications of their future recommendations and actions. It is important that the learner understands the importance of maintaining an awareness of current legislation and Codes of Practice in relation to forest work.

Centres are encouraged to introduce employers and specific professionals from the forestry industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner's experience by studying machinery in operation.

It is anticipated that the delivery of this unit will be delivered through supervised practical training and the learner able to consolidate operational skills within realistic working environments. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of forestry work and the impact of weather extremes on forestry operations.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are they are linked directly with interactive practical lessons in a real environment. The learner must be given the opportunity to work with a range of equipment and machinery in different forest situations which reflects current industry practice. It is anticipated that the range of machinery may include that adapted from the construction or agricultural industries as well as purpose built equipment.

## Suggested learning resources

**Books**


Agate E. 2000. *Toolcare: 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

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

Kerr G. 1993. *Growing Broadleaves for Timber* Forestry Commission, ISBN 0117103144

Mason WL. 1999. *Cultivation of Soils for Forestry.* Forestry Commission. ISBN 085538400X

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

Trout RC. 2006. *Forest Fencing.* Forestry Commission. ISBN 0855386886

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

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

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

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

Kerr G. & Kaufe J. 2011 *Thinning Practice A Silvicultural Guide.* Forestry Commission

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Forest Industry Safety Accord (FISA) Safety Guides


**Journals and magazines**


Arboricultural Association Arb Magazine

Forestry and British Timber

Quarterly Journal of Forestry

Forestry (ICF)

# Unit 364 Principles of amenity or forestry establishment

| | |
|---|---|
| **UAN:** | D/507/4674 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of tree and shrub establishment and protection and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will understand the importance to society and the environment of tree establishment. The objectives of tree establishment, possible financial support and legal considerations will also be examined. The learner will also develop their understanding of the limitations of common establishment and protection methods and be able to develop their practical skills to establish and protect either amenity or forest trees.

## Learning outcomes

In this unit, learners will:

1. Identify woody plants
2. Understand the site and establishment requirements of trees and shrubs
3. Understand the environmental and legal considerations relevant to tree establishment and protection
4. Plan for successful amenity or forestry establishment

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Identify woody plants**

### Topics

1.1 Identifying woody plants by botanical names.

1.2 Dendrological features of woody plants

**Topic 1.1**

Learners will identify relevant woody plants (minimum 80) using the genus and specific epithet in accordance with the binomial naming system.

**Topic 1.2**

Learners will understand dendrological features of woody plants selected in Topic 1.1, eg:

leaf, buds, leaf and buds scars, bark, lenticels, flowering form, fruit/seed formation and dispersal, crown habit

### Learning outcome

**2. Understand the site and establishment requirements of trees and shrubs**

### Topics

2.1 The suitability of trees and shrubs for a variety of conditions

2.2 The influence of infrastructure on the selection of trees and shrubs

2.3 The factors that influence plant selection

**Topic 2.1**

Learners will evaluate the suitability of trees and shrubs for a variety of situations, including: exposed sites, confined sites, weedy sites, compacted soils, poor drainage/wet sites, shallow soil depth, dry, acid soils, clay and sandy soils.

**Topic 2.2**

Learners will understand the influence of infrastructure on the selection of trees and shrubs such as: underground and overhead services, highways, footpaths, rights of way, easement, building foundations, non-porous surfacing, reflective surfaces and sustainable urban drainage systems.

**Topic 2.3**

Learners will describe the factors that influence plant selection such as: ultimate size, shape, seasonal colour, flowering period, hardiness, ability to cope with site specific conditions eg high or low water availability, aesthetic value, root spread, fruit production, possible seasonal nuisance, arboricultural or silvicultural merit.

## Learning outcome

**3. Understand the environmental and legal considerations relevant to tree establishment and protection**

## Topics

3.1 Benefits to society of tree establishment.

3.2 Financial support available for tree establishment and protection.

3.3 Environmental considerations associated with tree establishment and protection.

3.4 The legal considerations associated with tree establishment and protection

In this outcome learners will consider the range of benefits to society and the growing importance of green infrastructure as well as the practical aspects of tree planting. They will also explore the environmental and legal considerations pertaining to the establishment of trees.

A thorough knowledge of funding opportunities is vital and should emphasise the use and application of grants, sponsorship and associated support.

**Topic 3.1**

Learners will understand how trees benefit society through reduced pollution, improved air quality, increased employment prospects, increased visitor numbers, increased property values, increased access to the countryside, healthier lifestyles, community interaction, social improvements, reduced energy consumption, financial benefits, regeneration of derelict and industrial land, improved landscapes, increased wildlife habitat and diversity

**Topic 3.2**

Learners will know the potential financial support opportunities for planting schemes such as commercial loans, sponsorship, grants and fundraising

**Topic 3.3**

Learners will understand the environmental aspects of tree establishment including the requirements under the control of pollution legislation, oil and fuel spillage and storage, soil stability and erosion, soil compaction, nesting and breeding seasons, protected species, waste disposal, watercourses, archaeology, brash matting

**Topic 3.4**

Learners will understand how legislation and industry standards apply to tree establishment practices and could include the Control of Substances Hazardous to Health (2002), Environmental Protection Act 1990 (as amended), Food and Environmental Protection Act 1990 (as amended), Wildlife and Countryside Act 1981 (as amended), Highways Act (1980), Plant Health Act 1967 (as amended) specifically the phytosanitary certification and import requirements, Forestry Act 1967 (as amended) BS 8545-2013 Trees: from nursery to independence in the landscape - Recommendations
Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

## Learning outcome

**4. Plan for successful amenity or forestry establishment**

## Topics

4.1 Future considerations of tree establishment

4.2 Methods of site preparation

4.3 Produce planting specifications

In this outcome learners will plan tree establishment using knowledge of species characteristics, site appraisal and preparation, and the formulation of a planting specification appropriate to a selected project. They will also investigate the developing technologies and materials available for the establishment of urban trees and the potential for wider urban planting.

**Topic 4.1**
Learners will understand the future considerations for tree establishment, eg: mature size, growth rate, timber characteristics, root morphology, water requirements, resilience (pest and diseases, climate), longevity, future maintenance requirements and phenology

**Topic 4.2**
Learners will understand the methods of site preparation prior to the establishment of trees and shrubs including:

- Site appraisal: aspect, micro-climate, prevailing problems, soil type, pH, indicator species.
- Surface preparation: mowing, herbicide application, cultivation
- Hand preparation of soil: digging with spades, slitting
- Mechanical soil preparation: ploughing and cultivation including sub-soiling, use of borers (handheld and tractor mounted), use of tree spades, slitters, rotavators, spading machines, scarifying, mulching, mounding and dolloping
- Specialised urban planting systems : tree pits, paved zones, geo-grids, cellular confinement , structural soil

**Topic 4.3**
Learners will prepare a planting specification for a given project. The specification will include:

- Site preparation requirements
- Species, quantity, spacing, quality and type trees and shrubs
- Planting method: mound planting, notch, pit planting, tree spades
- Planting protection: tree shelters, fencing, guards, mulching
- Equipment, storage and transport, irrigation

## Guidance for delivery

This unit is designed to provide the learner with the sound knowledge and skills required to successfully establish and protect trees appropriate to the area of study. The unit should cover as wide a range of establishment and protection techniques as possible, appropriate to the area of study as well as those locally or regionally significant to the learner.

Throughout the unit, the emphasis should be on safe working and sound environmental practices. It is expected that the learner will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for learners to operate machinery to clear and prepare sites for planting therefore health and safety issues relevant to the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessment. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual. It is not necessary for the learner to use fertilisers, pesticides or other methods of tree protection which require legal approval. Simulation and demonstration could be used to illustrate appropriate methods and equipment which are commonly used, but which are unavailable to the learner.

A learner working towards level 3 is likely to have experience of practical forestry or arboricultural activities. This unit aims to extend the learner's knowledge and skills involved with ensuring the successful establishment and protection of healthy trees and forests. Emphasis should be placed not only on 'doing', but also upon the importance of planning and strategies to ensure safe, efficient and effective operations. It is important that the learner understands the importance of maintain an awareness of current legislation and Codes of Practice in relation to establishment and protection work.

Centres are encouraged to introduce employers and specific professionals from the forestry and arboriculture industries to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner's experience. In addition, current and topical issues regarding tree establishment and protection should be highlighted as and when they arise.

It is anticipated that the delivery of this unit will be delivered through supervised practical training and the learner be able to consolidate operational skills within realistic working environments. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of tree planting and the impact of weather extremes on operations.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are linked directly with interactive practical lessons in a real environment. The learner must be given the opportunity to work with a range of equipment and machinery in different establishment situations which reflects current industry practice.

## Suggested learning resources

**Books**


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

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

Kerr G. 1993. *Growing Broadleaves for Timber* Forestry Commission, ISBN 0117103144

Mason WL. 1999. *Cultivation of Soils for Forestry.* Forestry Commission. ISBN 085538400X

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

Trout RC. 2006. *Forest Fencing.* Forestry Commission. ISBN 0855386886

Potter MJ. 1991. *Tree shelters*. Forestry Commission. ISBN 0117102881

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

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides.


**Journals and magazines**

Arboricultural Association newsletter
Forestry and British Timber
Quarterly Journal of Forestry

**Websites**

| | |
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| Forestry Commission | www.forestry.gov.uk |
| Conservation volunteers | www.tcv.org.uk |

# Unit 365 Woodland management

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| **UAN:** | |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of the principles of woodland management and how these can be applied in practice. It is key that leaners gain an understanding of how woodlands are designed and managed based on recommendations from data collected. This unit is intended for learners in a centre-based settings looking to progress into the sector or further education and training.

This unit aims to provide learners with sufficient skills to create their own woodland management plans and to evaluate the existing management of woodlands for multipurpose objectives.

## Learning outcomes

In this unit, learners will be able to:

1. Understand woodland management objectives
2. Understand woodland management planning
3. Obtain woodland data and information
4. Produce woodland management plans

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Understand woodland management objectives**

### Topics

1.1 Woodland management objectives

1.2 Potential conflicts which may exist in relation to the use of woodlands

**Topic 1.1**

Learners will understand the various uses of woodland and multiple management objectives including:

- timber production
- conservation/ wildlife
- amenity/community use
- landscape
- recreation
- sporting game/management

**Topic 1.2**

Learners will identify the potential conflicts which may arise in relation to the use of woodlands:

- land owners
- local population
- Local Planning Authorities
- site management
- maintenance
- different woodland users
- facilities
- access.

### Learning outcome

**2. Understand woodland management planning**

### Topics

2.1 The structure, content and presentation of a woodland management plan

2.2 Techniques used to assess woodlands

2.3 How to achieve the best balance between present and potential woodland uses

**Topic 2.1**

Learners will understand the structure, content and presentation of a woodland management plan including: introduction, site description, inventory, maps, collected data, appropriate management

objectives, recommended objectives, schedule of activities, operational requirements, health and safety requirements, professional style, accuracy, logical, tables, graphs and maps.

**Topic 2.2**

Learners will understand various techniques used to survey woodlands which should cover:

- usage
- biodiversity/ecology
- Condition, Opportunity and Threat (COT)
- landscape character
- game cover
- water catchment

**Topic 2.3**

Learners will understand how to achieve the best balance between present and potential woodland uses covering:

- Legal aspects: Felling licences, Tree Preservation Orders, Local Planning Authority, Health and Safety, and Rights of Way.
- Environmental aspects: Areas of Outstanding Natural Beauty, Sites of Special Scientific Interest, National Nature Reserve, Local Nature Reserve, National Park
- Requirements of woodland users: Access, community use, recreation, timber production, conservation, wildlife, game, sporting
- Economic and financial aspects: Grants available for tree planting, local funding initiatives (eg wood fuel, species reintroductions, and woodland burials), community forests, national funding, Forestry Commission, sale of products and services
- Physical aspects: Topography, soil type, water courses, wildlife, plants, crop species, crop age, crop density, current management plans, public roads, internal access, and car parking

Centres should consider current versions of the legislation.

## Learning outcome

**3. Obtain woodland data and information**

## Topics

3.1 record data and collect information relevant to woodlands

3.2 Interpret data and information collected

In this outcome leaners will be required to collect and interpret data and information relevant to specified woodland sites. Learners should look at a wide range of possible data, from specified sites and from different resources. It is anticipated that the delivery of this unit will require some formal lectures, but will mainly be delivered through independent learner research and visits to appropriate woodland sites.

**Topic 3.1**

Learners will record data and collect information relevant to specified woodland sites. This will include:

- physical data :roads, rides, public rights of way, surrounding land use, topography, orientation, boundary, drainage, watercourses, ponds, and structures.
- iological data: species present, canopy structure, animals, pests, and diseases,
- ree data :diameter at breast height (DBH), stocking density, species mix, height, basal area, volume, form, canopy height,and potential value
- eteorological data: temperature extremes, wind speed, wind direction, sunlight hours, and rainfall.
- oil data: type, texture, structure, and pH.

**Topic 3.2**

Learners will interpret data and information collected from Ordnance Survey maps, soil maps, site surveys, inventories, Met Office data, public records and historical records.

### Learning outcome

**4. Produce woodland management plans**

### Topics

4.1 Produce a management plan for a given woodland site including information on perceived resilience and operational/health and safety requirements

4.2 Present a woodland management plan appropriately to a given audience

**Topic 4.1**

Learners will produce a professional management plan for a given woodland, which will include: introduction, site description, inventory, maps, collected data, appropriate management objectives, recommended objectives, schedule of activities, operational requirements, health and safety requirements. Learners will consider the resilience of the woodland in relation to the species composition and the perceived immigration of non-native pest species,

**Topic 4.2**

Learners will present the management plan outlined in Topic 4.1 appropriately to a given audience.

## Guidance for delivery

This unit is designed to provide the learner with knowledge and skills required to understand features of woodland and create functional woodland management plans. Learners will locate, collect, summarise and present a wide range of inventory data and relevant information regarding woodlands and use this to inform management decisions. They will consider relative values and attributes of different woodland sites, and appropriate management objectives for these sites. The unit should cover a range of possible activities and potential sites.

Throughout the unit the emphasis should be on safe working and sustainability. It is expected that learners will be aware of safe working practices and familiar with accepted practices and behaviours within the context in which they are working. The importance of sustainable practices should be woven into the delivery throughout.

This unit aims to extend the learners knowledge and skills involved with woodland management. Emphasis should be placed upon the importance of management plans and health and safety. Centres

are encouraged to introduce employers and specific professionals from industry to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of woodlands to add depth to the learner experience and put practices into context.

It is accepted that formal lectures will be necessary at level 3, but for this unit it is recommended that they are linked directly with interactive lessons in a real environment including identification sessions in the field. Learners must be given the opportunity to deal with a range of activities in different situations that reflect current industry trends.

## Suggested learning resources

**Books**


Bedoyere C. 2004. *Portrait of a Woodland: Biodiversity in 40 Acres.* Search Press. ISBN 1844480135

Buckley G. 1992. *Ecology and Management of Coppiced Woodlands.* Kluwer Academic Publishers. ISBN 0412431106

Forestry Commission. 1997. *The Management of Semi-Natural Woodlands*. Forestry Commission. ISBN 0855382600

Forestry Commission. 1990. *Forest Nature Conservation Guidelines*. The Stationary Office Books. ISBN 011710292X

HSE. 2003. *Managing Health and Safety in Forestry* (Leaflet). Health and Safety Executive. ISBN 0717627179

Kennedy F. 2002. *The Identification of Soils for Forest Management*. Forestry Commission. ISBN 0855385596

Lane A and Tait J. 1990. *Woodlands.* Hodder Arnold. ISBN 0340533668

Mackie ED and Matthews RW. 2006. *Forest Mensuration: A Handbook for Practitioners.* Forestry Commission. ISBN 0855386215

Peterken G. 2006. *Natural woodland: Ecology and Conservation in Northern Temperate Region*. Cambridge University Press. ISBN 0521367921

Peterken G. 1993. *Woodland Conservation and Management, 2nd Edition*. Springer. ISBN 0412557304

Rackham O. 2001. *Trees and Woodlands in the British Landscape: The Complete History of Britain's Trees, Woods and Hedgerows.* Orion Publishing. ISBN 1842124692

Rollinson T. 1988. *Thinning Control.* Forestry Commission. ISBN 0117102563

Watkins C. 1990. *Woodland Management and Conservation*. David & Charles PLC. ISBN 0715393294


Best Practice Guidance including Forest Industry Safety Accord (FISA) and Arboriculture and Forestry Advisory Group (AFAG)

**Journals and magazines**

Quarterly Journal of Forestry

Forestry

Forestry and British Timber

**Websites**

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|---|---|
| www.forestry.gov.uk | The Forestry Commission |
| www.naturalengland.org.uk | Natural England |

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| www.confor.org.uk | Confor promoting forestry and wood |
| www.rfs.org.uk | Royal Forestry Society |
| www.woodlandtrust.org.uk | The Woodland Trust |

# Unit 366 Advanced arboricultural practices

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| **UAN:** | K/5074676 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of advanced arboricultural practices and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will safely climb trees and select and use appropriate equipment to inspect trees as well as undertake a range of preventative and remedial operations. The range of pruning cuts and techniques will be examined in conjunction with trees' responses to wounding, with emphasis on how to relate this to the tree care decision making process. In addition, the learner will undertake advanced felling techniques and dismantle trees.

## Learning outcomes

In this unit, learners will:

1. Access trees using simple and advanced methods.
2. Carry out and record aerial inspections of trees.
3. Carry out specified pruning operations within tree canopies.
4. Dismantle small to medium sized trees.

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Access trees using simple and advanced methods**

#### Topic

1.1 Carry out a risk assessment
1.2 Select, inspect and safely use appropriate tree climbing equipment
1.3 Climb to the required working positions safely and efficiently
1.4 Work with ground staff to achieve a safe working environment

In this outcome the learners will access trees, using methods including various friction hitches, self-tending systems and friction devices. It is anticipated that this outcome will be delivered through supervised practical sessions that encourage the learner to consolidate operational skills within realistic working environments. To undertake this outcome the learner should be given access to appropriate climbing and access equipment and have received sufficient preparatory training in safe tree climbing and work positioning techniques.

**Topic 1.1**

The learners will carry out risk assessments with close attention to the following points:

- Identification of appropriate hazards and risk levels
- Site and ground conditions, weather conditions, tree condition (VTA of all areas of the tree fungal fruit bodies, wildlife)
- Operator, machine and task
- Public access and rights of way/highways
- Power lines
- Noise levels
- Risk control and reduction
- Establishment of safety zones
- Emergency procedures
- Rescue equipment
- First aid provision
- Refuelling site,
- Personal Protective Equipment (PPE)
- Safety Guides (Arboriculture and Forestry Advisory Group (AFAG), Forest Industry Safety Accord (FISA))

**Topic 1.2**

The learner will select, inspect and safely use appropriate climbing equipment. This could include:

- climbing and lowering ropes: static, semi-static, dynamic
- tie, set and dress climbing knots: perfection loop, bowline, appropriate stopper knot dependent on rope used
- tie, set and dress friction hitches:
  - simple: eg prussik, klemheist
  - advanced: eg distel, VT, swabish, knut
- harnesses

- other climbing equipment: karabiners, strops, slings, throwlines, friction devices (eg lock jack, spider jack, zig zag), rope grabs, cambium savers, hitch climber and other pulleys

They will also perform a pre-use inspection of the equipment to identify common faults. The inspection will be based on LOLER 1998 and include:

- ensuring equipment is appropriate to selected working methods
- definition and status of a 'competent person' and the requirements for independence
- Certificates of Conformity
- categories of equipment
- appropriate examination intervals
- marking of individual items of equipment
- wear patterns and types of damage
- wear limits and tolerances

**Topic 1.3**

The learner will climb safely and efficiently to the required working positions. They will use safe and appropriate access methods such as:

- ladders, Mobile Elevated Work Platforms (MEWPs), rope and harness

They will also achieve safe work positions using the following techniques:

- selection of appropriate high central anchor points and supplementary anchor points
- changing of anchor points
- triangulation
- re-directs
- good rope organisation
- branch walking and controlled return to stem

**Topic 1.4**

The learner will work with ground staff to achieve a safe working environment through the following methods:

- brief and direct ground staff
- use effective communication systems
- maintain continuous awareness of hazards
- have appropriate rescue equipment available

## Learning outcome

**2. Carry out and record aerial inspections of trees**

## Topics

2.1 Factors relevant to the inspection of trees from the ground.

2.2 Access the tree to perform an aerial inspection safely and effectively.

2.3 Assess trees and produce a schedule of preventative or remedial works

In this outcome learners will carry out and record aerial inspections of trees in accordance with accepted industry standards. The learner should be encouraged to inspect trees within a range of management situations. Meetings to discuss real tree inspections with Local Planning Authority tree officers or statutory undertakers are encouraged.

**Topic 2.1**

The learners will understand the factors relevant to the inspection of trees from the ground, to include:

- gathering appropriate data
- identifying defects
- decay detection
- hazard evaluation
- making recommendations for remedial work
- looking for habitat potential
- the need and reasons for aerial inspection

**Topic 2.2**

Learners will access the tree using methods from Topic 1.3 and move effectively within the canopy to perform an aerial inspection that considers the following:

- tree health and condition
- signs and symptoms of pests, pathogens and disorders
- habitat potential
- decay detection
- structural and bio-mechanical defects
- tree dimensions
- further investigation

**Topic 2.3**

Learners will assess trees and complete an inspection form in a recognised format.

They will also produce a schedule of work with tree work specifications that may include the following:

- tree pruning or removal
- bracing
- recommendation for monitoring
- monitoring, control or prevention of pests, pathogens and disorders
- root zone amelioration
- prioritisation or staging of work

## Learning outcome

**3. Carry out pruning operations within tree canopies**

## Topics

3.1 How current theory on wound responses informs pruning methods.

3.2 Access the tree to perform preventative and remedial pruning using appropriate methods.

In this outcome the learner will be required to carry out pruning operations within tree canopies. To undertake this outcome the learner should be given access to appropriate pruning equipment.

**Topic 3.1**

The learners will understand the variety and appropriateness of pruning cuts and how they are influenced by current theory on wound response. Consideration will be given to:

- timing of operations
- natural target pruning vs flush cutting, branch collars and the branch bark ridge
- systematic branch reduction (step cuts, directional cuts)
- appropriate tools and equipment
- british standard 3998
- crown thinning, crown reduction and crown lifting
- brashing, pollarding, coppicing and dead-wooding

**Topic 3.2**

Learners will access the tree using methods from Topic 1.3. They will move effectively within the canopy to carry out specified preventative and remedial pruning, which could include the following:

- crown-lifting
- crown-thinning
- crown-reduction / reshaping
- re-pollarding
- restoration pruning
- conservation pruning / habitat creation
- crown cleaning

## Learning outcome

**4. Dismantle small to medium size trees**

## Topics

4.1 Select, inspect and use tools and equipment available for dismantling trees

4.2 Access the tree canopy to remove branches using freefall techniques.

4.3 Remove branches and vertical sections with rigging equipment from the canopy.

4.4 Control removal of branches and vertical sections with rigging equipment from the ground

In this outcome the learners will be required to dismantle trees by removing branches and felling vertical sections of the stem. They will also use rigging equipment from the ground to control severed sections. To undertake this outcome the learner should be given access to appropriate chainsaws and rigging equipment.

**Topic 4.1**

Learners will select and inspect tools and equipment for dismantling trees. These could include:

- cutting equipment: chainsaws, handsaws, polesaws
- rigging equipment: friction bollards / capstans, lowering ropes, slings, strops, split tails, pulleys, whoopey slings, steel karabiners, climbing spikes, wire core flipline
- rigging knots: eg timber hitch, cow hitch, running bowline

**Topic 4.2**

Learners will access the tree using methods from Topic 1.3 and move effectively within the canopy to carry out the removal of branches using freefall techniques and incorporating the following:

- correct working position
- implementation of appropriate cuts
- correct operation of equipment
- safe working practices
- appropriate disposal of waste
- prevention of pollution
- minimise environmental impact

**Topic 4.3**

Learners will remove branches and vertical sections of the stem with rigging equipment from the canopy, whilst demonstrating the following:

- selection of appropriate anchor points for rigging equipment
- selection and use of rigging equipment appropriate for the predicted load
- appropriate work positioning
- appropriate sequence of cuts
- safe and efficient chainsaw operation
- effective communications with ground staff Awareness of hazards and escape routes below

**Topic 4.4**

Learners will control removal of branches and vertical sections of the stem with rigging equipment from the ground, whilst demonstrating the following:

- selection and use of rigging equipment appropriate for the predicted load
- safe lowering of cut material
- safe and efficient chainsaw operation
- effective communications with canopy staff
- lower and control cut sections from the ground
- awareness of hazard zones and escape routes
- safe working distances

## Guidance for delivery

This unit should be undertaken by learners who already have a grasp of the principles of tree climbing gained in Unit 326. It is designed to provide the learner with knowledge and the skills required to safely undertake advanced arboricultural operations. A learner working towards level 3 is likely to have experience of practical arboricultural activities. This unit aims to develop the learner's knowledge and skills involved with the safe use of chainsaws, tree climbing and related operations. Emphasis should be placed upon 'doing' but it is important that the learner understands the importance of maintaining an awareness of current legislation and Codes of Practice in relation to tree climbing and related operations.

It is accepted that formal lectures are necessary at level 3 but for this unit it is recommended that they are they are linked directly with interactive practical lessons in a real working environment. The learner should be given the opportunity to undertake a range of arboricultural operations on different sites and situations which reflects current industry practice.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner will be aware of safe working practices in chainsaw and aerial tree work, as well as familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery and climb trees, therefore health and safety issues relevant to the operation of the machinery used and aerial tree work must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

Any legal permission required to prune or fell trees must be obtained and equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998 and Lifting operations and Lifting Equipment Regulations 1998 (LOLER). Adequate Personal Protective Equipment (PPE) appropriate to the learner, the equipment and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

The learner should be encouraged to inspect trees within a range of management situations and meet with Local Planning Authority tree officers and statutory undertakers to discuss real case studies of the need for tree inspections. Consideration should be given to the seasonal nature and timing of tree inspections, with regard to when signs and symptoms may most easily be found.

Learners should be given access to appropriate climbing and access equipment to undertake this unit and receive sufficient preparatory training in the safe use of tree climbing, pruning equipment and work positioning. Learner should also be given the opportunity to undertake a range of types of pruning and dismantling work in realistic working environments but must not be required to work on hazardous trees or work sites where the level of risk is deemed to be unacceptable.

This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations or the Level 3 Certificate of Competence will **not** directly lead to certification. If learners want to achieve the Level 2 Award in Chainsaw and Related Operations they will need to register and take the assessment separately through City & Guilds.

## Suggested learning resources

**Books**

*Anon. 2010. BS 3998: Recommendations for Tree Work*. British Standards Institute. ISBN 9780580537776

Anon. 2005. *A Guide to Good Climbing Practice*. Arboricultural Association. ISBN 0900978392

Anon. 2008. *A Guide to the Use of MEWPs in Arboriculture*. Arboricultural Association. ISBN 0900978449

Brown G and Kirkham T. 2004. *The Pruning of Trees, Shrubs and Conifers*. Timber Press. ISBN 0881926132

Cowell, Detter etal. 2008. (RR668) Evaluation of current rigging and dismantling practices used in arboriculture. HSE

Cowan A. 2003. *Trees and Bats*. Arboricultural Association. ISBN 0900978376

Donzelli PS and Lilly SJ. 2001. *The Art and Science of Practical Rigging*. International Society of Arborists.

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

Ireland D. 2004. *Winching Operations in Forestry*. The Stationary Office Books. ISBN 085538638X

Jepson J. 2000. *The Tree Climber's Companion*. Access publishing Inc. ISBN 0615112900

Kestel B. 2005. *Chainsaw Operator's Manual: The Safe Use of Chainsaws*. Landlinks Press. ISBN 0643090282

Lingens D. 2006. *Tree Climber's Knotbook*. Schlauverlag.

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

Mynors C. 2002. *The Law of Trees, Forests and Hedgerows.* Sweet and Maxwell. ISBN 0421590408

Shigo AL. 1989. *Tree Pruning: A Worldwide Photo Guide*. Shigo and Trees Associates. ISBN 0943563089

**Journals, magazines and guides**

Arboricultural Advisory Information Service publications

Arboricultural Association newsletter

Journal of Arboriculture

NPTC workbooks 2007 / 2013 / 2108

AFAG guides

FISA guides

Husqvarna workbooks

**Websites**

http://www.climbingarborist.com/

http://www.hse.gov.uk/treework/safety-topics/climbing-operations.htm

http://treeclimbing.com/index.php/climbing/technique

# Unit 367 Arboricultural skills

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| **UAN:** | M/507/4677 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of the arboricultural skills and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will develop the skills and knowledge required to carry out ground based and aerial arboricultural operations, including branch removal, and pruning of trees. The relevant health and safety and other legislations are also covered.

## Learning outcomes

In this unit, learners will:

1. Access tree canopies using safe and efficient methods
2. Understand requirements for simple pruning operations in trees
3. Carry out simple pruning operations on small to medium trees
4. Understand the legal and safety implications associated with tree pruning and dismantling
5. Support tree climbing operations

## Learning outcome

**1. Access tree canopies using safe and efficient methods**

## Topics

1.1 Carry out a risk assessment
1.2 Select and safely use appropriate tree climbing equipment
1.3 Climb to the required working positions safely and efficiently
1.4 Work with ground staff to achieve a safe working environment

In this outcome the learner will access tree canopies using safe and efficient methods. It is anticipated that this outcome will be delivered through supervised practical sessions that encourage the learner to consolidate operational skills within realistic working environments. The learner should be provided with appropriate climbing and access equipment to undertake this outcome and have received sufficient preparatory training in the safe use of tree climbing and work positioning equipment. The learner should not climb hazardous trees or work on sites where the level of risk is deemed to be unacceptable.

**Topic 1.1**

Learners will carry out risk assessments with close attention to the following points:

- identification of appropriate hazards and risk levels
- site and ground conditions, weather conditions, tree condition
- operator, machine and task
- public access and rights of way/highways
- power lines
- noise levels
- risk control and reduction
- establishment of safety zones
- emergency procedures
- rescue equipment
- first aid provision
- refuelling site
- Personal Protective Equipment (PPE)
- Safety Guides (Arboriculture and Forestry Advisory Group (AFAG), Forest Industry Safety Accord (FISA))

**Topic 1.2**

The learner will select and use safely appropriate climbing equipment, which could include:

- climbing ropes: semi-static, dynamic
- tie, set and dress climbing knots: prussik loop, bowline, appropriate stopper knot dependent on climbing rope used
- tie, set and dress friction hitches: eg prussik, blakes hitch, distel, and klemheist
- harnesses
- other climbing equipment: karabiners, strops, slings, throwlines, rope grabs, cambium savers and pulleys

**Topic 1.3**

The learner will climb safely and efficiently to the required working positions. They will use safe access methods such as:

- ladders, Mobile Elevated Work Platforms (MEWPs), rope and harness

They will also achieve safe work positions using the following techniques:

- selection of appropriate high anchor points and supplementary anchor points
- changing of anchor points
- good rope organisation
- branch walking and controlled return to stem
- re-directs

**Topic 1.4**

The learner will work with ground staff to achieve a safe working environment through the following methods:

- brief and direct ground staff
- use effective communications
- maintain continuous awareness of hazards
- have appropriate rescue equipment available

## Learning outcome

**2. Understand requirements for simple pruning operations in trees**

## Topics

2.1 Current pruning terminology

2.2 Appropriate selection and order of cuts

2.3 Identify and select the appropriate pruning methods for a given scenario.

In this outcome the learner will understand the requirements for simple pruning operations in trees. This could be through supervised practical sessions that allow the learner to consolidate knowledge within realistic working environments. Continual reference should be made to current industry best practice guidance and standards. It would be beneficial to include learning within the wider context of tree biology and science. Reference and links to current wound response theories and pathogen infection mechanisms would enhance the learner's understanding.

**Topic 2.1**

Learners will understand the terms as per British Standard 3998: Recommendations for Tree Work:

- Target pruning
- Branch collar
- Branch bark ridge
- Pruning to growth points

**Topic 2.2**

Learners will understand the reasons for using appropriate cuts and the importance of the correct order. The cuts to include:

- step cuts (outboard free fall, inboard handheld)
- directional sink cuts (hand held and free fall)
- pruning cut to the branch collar or growth point
- holding cut

**Topic 2.3**

Learners will identify and select the appropriate pruning operations for a given specification, which could include:

- crown thinning
- crown reduction
- crown lifting
- formative pruning
- dead wooding
- pollarding
- conservation pruning.

## Learning outcome

**3. Carry out simple pruning operations on small to medium trees**

## Topics

3.1 Identify and select appropriate equipment for pruning trees

3.2 Carry out simple pruning operations on small to medium trees

In this outcome the learner will carry out simple pruning operations on trees. It is anticipated that this outcome will be delivered through supervised practical sessions that allow the learner to consolidate operational skills within realistic working environments. The learner should be given the opportunity to undertake a range of pruning work and should not work on hazardous trees or work sites where the level of risk is deemed to be unacceptable.

**Topic 3.1**

The learners will identify and select the appropriate equipment for pruning small to medium size trees, including:

- secateurs, handsaws, loppers, pole saws
- climbing equipment: harness, rope, prussik loops, karabiners, split tail, slings, long lanyard, cambium saver

**Topic 3.2**

Learners will carry out simple pruning operations using the appropriate pruning equipment including: secateurs, handsaws, loppers. Learners will ensure:

- effective communications
- achieving an appropriate work positioning
- safe and efficient use of tools ( handsaws, secateurs)
- using appropriate cuts accurately and in the correct order
- minimising damage to residual tree
- controlled descent
- retrieval and correct storage of equipment
- worksite left in a safe and tidy condition
- appropriate disposal of waste
- prevention of pollution
- minimising environmental impact

The learners will carry out work in accordance with BS3998 and to a given specification, for example:

- client's requirements
- tree preservation order permission

## Learning outcome

**4. Understand the legal and safety implications associated with tree pruning and dismantling**

## Topics

4.1 The legal and safety implications associated with tree pruning and dismantling

In this outcome the learner will explore the legal and safety implications of aerial arboricultural work. These sessions should allow the learner to consolidate knowledge within realistic working environments. They should also appreciate the importance of maintaining an awareness of current legislation and Codes of Practice which may relate to arboricultural operations.

**Topic 4.1**

The learners will know current codes of practice and legislation appropriate to aerial tree works including:

- Health and Safety at Work Act 1974
- Wildlife and Countryside Act (1981) (as amended)
- Management of Health and Safety at Work Regulations 1992 (as amended)
- Personal Protective Equipment (PPE) Regulations (1992)
- Provision and Use of Work Equipment Regulations 1998 (PUWER)
- Lifting Operations and Lifting Equipment Regulations 1998 (LOLER)
- Countryside and Rights of Way Act 2000
- First Aid Regulations 2005
- Work at Height Regulations 2005
- Town and Country Planning (Trees) (England) Regulations 2012

## Learning outcome

**5. Support tree climbing operations**

## Topics

5.1 Climbing and aerial rescue techniques

5.2 Assist tree pruning and removal operations from the ground

5.3 Disposal of arisings in accordance with safe working practices and environmental considerations

In this outcome the learner will support tree climbing operations, carry out aerial rescue and dispose of arisings appropriately. It is anticipated that this outcome will be delivered through supervised practical sessions that allow the learner able to consolidate operational skills within realistic working environments. The learner should be given the opportunity to support a range of types of tree work but must not be required to work on hazardous trees or work sites where the level of risk is deemed to be unacceptable.

**Topic 5.1**

The learner will perform tree climbing and aerial rescue using the following methods:

- assess situation and make safe
- plan rescue
- carry our aerial rescue as appropriate
- constant communication with casualty and supporting staff

Learners should be aware of follow up procedures, eg accident reporting, RIDDOR, site quarantine, review of risk assessment.

**Topic 5.2**

The learner will assist tree pruning operations from the ground using the following methods:

- set up and manage the site
- effective communication systems
- safe refuelling of equipment
- safely provide climber with equipment
- maintain an awareness of hazards
- appropriate disposal of arisings
- prevention of pollution
- minimise environmental impact

**Topic 5.3**

The learner will be aware of the following safe working practices and environmental considerations relevant to the disposal of arising's. :

- Environment Protection Act 1990
- Environmental Protection (Duty of Care) Regulations 1991
- Waste Management Licensing Regulations 1994
- Controlled Waste (Registration of Carriers and Seizure of Vehicles) Regulations 1991
- Register with Environment Agency (or equivalent)
- Waste Transfer Notes (WTNs) and record keeping

## Guidance for delivery

This unit is designed to provide the learner with the sound knowledge and the skills required to safely undertake aerial arboricultural operations. Throughout the unit, the emphasis should be on safe working. Learners should be provided an opportunity to develop their skills to use aerial chainsaws towards the end of this unit. Health and safety issues relevant to the operation of the machinery used and aerial tree work must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

The learner should be provided with appropriate climbing and access equipment to undertake this unit and to have received sufficient preparatory training in the safe use of chainsaws, tree climbing and work positioning. They should undertake a range of pruning work but should not work on hazardous trees or work sites where the level of risk is deemed to be unacceptable.

Any legal permission required to prune or fell trees must be obtained and equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998 and Lifting operations and Lifting Equipment Regulations 1998 (LOLER). Adequate Personal Protective Equipment (PPE) appropriate to the learner, the equipment and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

Learners should focus upon legislation specific to their location within the UK and understand the importance of maintaining an awareness of current legislation and Codes of Practice which may relate to tree pruning. Consideration should be given to the seasonal nature and timing of pruning in relation to tree species.

It is anticipated that the delivery of this unit will be through supervised practical training and that he learner will consolidate knowledge within realistic working environments. Continual reference should be made to current industry best practice guidance and standards. It would be beneficial to include learning within the wider context of tree science. Reference and links to current wound response theories and pathogen infection mechanisms would enhance the learner's understanding.

This unit will **not** directly lead to certification of competence to Level 2 Award Climb Trees and Level 3 Award Perform Aerial Rescue, or the Level 2 Award in Chainsaw and Related Operations, but can provide preparative training towards these qualifications. If learners want to achieve the above qualifications they will need to register and take the assessment separately through City & Guilds.

## Suggested learning resources

**Books**

British Standards Institute. 2010. *BS 3998: Recommendations for Tree Work.* London: British Standards Institute. ISBN 580 53777 6.

Brown, G.E., Kirkham, T. 2009. *The Pruning of Trees, Shrubs and Conifers.* Portland: Timber Press. ISBN 0881926132.

Cowell, Detter etal. 2008. (RR668)Evaluation of current rigging and dismantling practices used in arboriculture. HSE

Cottam, M., McKeown, L., White, C. 2006. *A Guide to Good Climbing Practice*. Cheltenham: Arboricultural Association. ISBN 0900978392.

Donzelli, P.S., Lilly, S.J. 2001. The Art and Science of Practical Rigging. Champaign: International Society of Arboriculture. ISBN 978-1881956280.

Jepson, J. 2000. The Tree Climber's Companion. Springfield: Access Publishing Inc. ISBN 0615112900.

Mynors, C. 2002. The Law of Trees, Forests and Hedgerows. London: Sweet and Maxwell. ISBN 0421590408.

Shigo, A.L. 1989. Tree Pruning: A Worldwide Photo Guide. Snohomish: Shigo and Trees Associates. ISBN 0943563089.

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

**Journals magazines and guides**

Arboricultural Advisory Information Service publications

Arboricultural Association newsletter

Journal of Arboriculture

NPTC workbooks 2007 / 2013 / 2108

AFAG guides

**Websites**

http://www.climbingarborist.com/

http://www.hse.gov.uk/treework/safety-topics/climbing-operations.htm

http://treeclimbing.com/index.php/climbing/technique

# Unit 368 Tree surveys and inspections

| | |
|---|---|
| **UAN:** | T/507/4678 |
| **Level:** | 3 |
| **GLH:** | 60 |

## What is this unit about?

The purpose of this unit is to provide learners with an understanding of tree surveys and inspections and how these can be put into practice. The importance of tree surveys and inspections continues to grow in response to the requirements to fulfil landowners' duty of care and appropriately manage tree stock within a wide range of situations, such as trees on development sites, street trees and parkland trees. Learners will develop their knowledge and skills in surveying and inspecting trees through general practical application and field data collection. Learners will be required to integrate all aspects of tree knowledge including the identification of tree species, diseases and disorders, as well as tree biomechanics. Learners will also develop report writing skills to meet different objectives and an understanding of the key legislation relating to trees in the UK.

## Learning outcomes

In this unit, learners will be able to

1. Legislation relating to tree surveys and inspections
2. Survey trees and woodlands
3. Inspect individual trees
4. Analyse and present results of tree surveys and inspections

## Scope of content

This section gives details of the scope of content to be covered in the teaching of the unit to ensure that all the learning outcomes can be achieved.

### Learning outcome

**1. Legislation relating to tree surveys and inspections**

### Topics

1.1 Differences between statute and common law
1.2 Legal responsibilities of tree, hedge and woodland ownership
1.3 How trees are protected under current relevant legislation
1.4 Procedures for undertaking works on protected trees

In this outcome learners will explore how common and statute law relate to the management of trees, woodland and hedgerows. It is accepted that this outcome will require formal delivery but it should also be delivered in practical situations where the learner is able to see trees which have statutory protection and understand the basis for protection being required. It would be beneficial to include learning within the wider context of legal responsibilities. For example, reference and links to 'high hedges' disputes and related legislation and processes would enhance the learners' understanding. The learners should be encouraged to assess a range of tree management situations and meet with Local Planning Authority tree officers and statutory undertakers to discuss the need to undertake tree surveys and inspections.

**Topic 1.1**

Learners will understand the differences between statute and common law:

- Statute Law: Acts of Parliament and subordinate legislation (Statutory Instruments, By-laws and Orders in Council)
- Common Law: Case law, judicial statutory interpretation, substantive law and procedural law

Learners should be aware of the differences between criminal and civil offences, as well as their potential implications upon a business or individual (e.g. criminal record, fines, insurance premiums, poor public relations).

**Topic 1.2**

Learners will understand the responsibilities of tree, hedge and woodland ownership under:

- statute law, to include: Occupiers' Liability Act 1957 (as amended), Countryside and Rights of Way Act 2000, Highways Act 1980. Miscellaneous Provisions Act 1976
- common law, to include: negligence, common law duty of care and obligations, legal nuisance and nuisance abatement, trees growing on or close to boundaries, trespass, , hazardous and poisonous trees, routine and adequate inspection,

**Topic 1.3**

Learners will understand how trees are protected under current relevant legislation, to include:

- Felling licence: Forestry Act 1967 (as amended), Environment Act 1995
- Hedgerow Regulations 1997
- Town and Country Planning Act 1990 (as amended) and Town and Country Planning (Trees) Regulations 2012,

**Topic 1.4**

Learners will understand the processes associated with undertaking works on protected trees, to include:

- Felling licence: application to the Forestry Commission, notification and consultation process, conditions normally attached to licences
- Trees in hedgerows: application to Local Planning Authority for permission to remove important hedgerows, appeals process
- Tree Preservation Orders and Conservation Areas: application to Local Planning Authority for permission or consent to undertake works, 1AP, notification and consultation process, appeals process, compensation,

## Learning outcome

**2. Survey trees and woodlands**

## Topics

2.1 Reasons for carrying out tree surveys

2.2 Methods and equipment for collecting, recording and storing tree survey data

2.3 Carry out tree surveys to collect data to meet specific objectives

2.4 Present findings in a format of a site map

In this outcome, learners will be required to survey and trees and woodlands. It is accepted that this outcome will require some formal delivery but it should be delivered in practical situations. The learner should be encouraged to survey trees within a range of management situations and meet with woodland managers and surveyors to discuss real case studies of the need for tree surveys and factors which may be considered. The learner will have knowledge of industry good practice in relation to survey techniques and will apply it accordingly

**Topic 2.1**

Learners will understand the reasons for carrying out tree surveys, to include: tree condition, valuation (commercial potential, aesthetics), mortgages, species diversity and distribution, pest, diseases and disorders and impact assessment (BS5837)

**Topic 2.2**

Learners will understand a range of methods and equipment for collecting, recording and storing tree survey data, to include:

- survey techniques (e.g. field walking, transects, triangulation, topographical).
- geographic information technologies (e.g. Global Positioning System (GPS), Geographic Information Systems (GIS), aerial photography and satellite imaging
- field survey equipment (e.g. rangefinder, portable computers and mobile devices, compass, measuring tape, , clinometers, field notebook, ruler, scale rule)

**Topic 2.3**

Learners will carry out tree surveys using a range of appropriate techniques in order to collect data to meet specific objectives. Whilst undertaking surveys, learners are expected to comply with current legislation and industry good practice.

**Topic 2.4**
Learners will produce a site map containing the following:

- North indicator
- Grid reference
- Scale
- Survey boundaries
- Structures and landscape features
- Tree location using numbering system
- Key
- Title block

## Learning outcome

**3. Inspect individual trees**

## Topics

3.1 Reasons for carrying out individual tree inspections
3.2 Methods and equipment for collecting, recording and storing tree survey and inspection data.
3.3 Inspect individual trees to collect data

In this outcome, learners will be required to inspect individual trees. It is accepted that this outcome will require some formal delivery but it should be delivered in practical situations. The learners should be encouraged to inspect trees within a range of management situations and meet with Local Planning Authority tree officers and statutory undertakers to discuss real case studies of the need for tree inspections, such as trees which may require statutory protection. It would be beneficial to include learning within the wider context of legal responsibilities. For example, reference and links to insurance claims and hazard assessment would enhance the learners' understanding. Learners are not required to undertake aerial inspections of trees, or to use semi-invasive or invasive techniques whilst inspecting trees where these are not appropriately justified. However, it would be beneficial for learners to inspect unhealthy or structurally unsound trees where safe to do so following an appropriate risk assessment. The learner will have knowledge of industry good practice in relation to inspection techniques and will apply it accordingly.

**Topic 3.1**
Learners will understand common reasons why individual tree inspections are carried out to include risk assessment, tree condition, amenity valuation, planning proposals and applications, insurance purposes, mortgage requirements, civil claims and alleged criminal activity, presence of protected species, hazard assessment, statutory protection, annual work programmes.

**Topic 3.2**
Learners will understand a range of methods and equipment for collecting, recording and storing tree inspection data, to include:

- inspection techniques
  - non-invasive (e.g. Visual Tree Assessment (VTA), nylon hammer, thermal imaging, tree radar),
  - semi-invasive . (e.g. sonic tomography, air spade)
  - invasive (e.g. drilling, increment borer, fractomoeter, resistograph,)

- geographic information technologies (e.g. Global Positioning System (GPS), Geographic Information Systems (GIS), aerial photography and satellite imaging
- tree inspection equipment (e.g. rangefinder, portable computers and mobile devices, compass, measuring tape, , nylon hammer, air spade, tree radar, clinometers, increment borers, resistograph, radar, fractometer, , sonic tomograph, field notebook, ruler, scale rule)

**Topic 3.3**

Learners will carry out individual tree inspections from the ground using a range of techniques in order to collect data to meet specific objectives. Whilst undertaking inspections, learners will comply with current legislation and industry good practice.

## Learning outcome

**4. Analyse and present results of tree surveys and inspections**

## Topics

4.1 Analyse and interpret data from tree surveys and inspections

4.2 Report on tree surveys and inspections and present information

4.3 Make recommendations appropriate to survey and inspection objectives

In this outcome, learners will be required to understand, evaluate and present findings of tree surveys and inspections. It is anticipated that the delivery of this outcome will require formal delivery, but it should be linked to the work undertaken in outcomes 2 and 3. It would be beneficial to include learning within the wider context of reporting on tree surveys and inspections. For example, reference and links to how expert witnesses present evidence in court would enhance the learners' understanding.

**Topic 4.1**

Learners will analyse and interpret data from their tree surveys and inspections

**Topic 4.2**

Learners will report on tree surveys and inspections and present information in an appropriate report format. Written reports should be appropriately structured (e.g. title, summary, introduction, methods used to acquire relevant data and information, evaluation methods used, recommendations to include further specialised third party input if appropriate).

**Topic 4.3**

Learners will make recommendations appropriate to the survey and inspection objectives (e.g. work priorities, tree pruning or removal, pest or pathogen control or prevention, signage or restriction of access, alleviation of ground compaction, statutory protection, insurance claim).

## Guidance for delivery

This unit is designed to provide the learner with a broad knowledge and awareness of tree surveys and inspections associated with a range of trees appropriate to the learner's area of study. The unit should cover a range of survey and inspection objectives and methods as appropriate to the area of study as well as those locally or regionally significant to the learner. Due to the seasonal nature and timing of events, such as when the signs and symptoms of pathogens are most easily visible, the timing of the delivery of outcomes 2 and 3 should be carefully planned.

It is anticipated that the delivery of this unit may initially focus mainly upon formal lectures but it is recommended that as far as is possible, they are linked directly with interactive lessons in a real environment. Where practical learning is undertaken, the emphasis should be on safe working. It is expected that learners will be aware of safe working practices and familiar with accepted industry practices and behaviours.

A learner working towards level 3 is likely to have experience of the management of trees with respect to good forestry and arboricultural practices. This unit aims to extend the learner's capabilities by ensuring they are given the opportunity to integrate their knowledge of trees to prepare and present recommendations for future tree management. It is important that the learner understands the practical implications of current legislation and codes of practice which may relate to tree survey and inspection work and the need to maintain a current awareness of legislation as it changes. In addition, relevant current and topical issues should be highlighted as and when they arise.

Centres are encouraged to introduce employers and specific professionals from the horticulture, forestry and arboriculture industries to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of sites to add depth to the learner's experience.

## Suggested learning resources

**Books**


Anon. 2003 *Guidance Note 4 – Visual Amenity Valuation of Trees and Woodlands: The Helliwell System.* Arboricultural Association. ISBN 0900978341

Anon. 2010. *BS 3998:2010 Tree Work: Recommendations*. British Standards Institute. ISBN 0580537773

Anon. 2012. *BS 5837:2012 Trees in Relation to Design, Demolition and Construction: Recommendations*. British Standards Institute. ISBN 058069917X

Fay N, Dowson D and Helliwell R. 2005. *Guidance Note 7 – Tree Surveys: A Guide to Good Practice.* Arboricultural Association. ISBN 0900978384

Harris RW, Clark JR and Matheny N. 2003. *Arboriculture: Integrated Management of Landscape Trees, Shrubs and Vines*. Prentice Hall. ISBN 0130888822

Helliwell R. 2003. *Visual Amenity Valuation of Trees and Woodlands*. Arboricultural Association. ISBN 0900978340

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 0117103382

Keefer CA. 2004. *A Consultant's Guide to Writing Effective Reports*. American Society of Consulting Arborists

Lonsdale D. 2013. *Principles of Tree Hazard Assessment and Management.* Arboricultural Association. ISBN 0900978570

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

Mattheck C and Breloer H. 1995. *The Body Language of Trees: A Handbook for Failure Analysis.* The Stationary Office Books. ISBN 0117530670

Mynors C. 2011. *The Law of Trees, Forests and Hedgerows*. *2nd Edition* Sweet and Maxwell. ISBN 1847039146

Shigo A. 1991. *Modern Arboriculture*. Shigo and Trees Associates. ISBN 0943563097

Schwarze F, Engels J, and Mattheck C 2012. *Fungal Strategies of Wood Decay in Trees*. Springer-Verlag. ISBN 3642631339

Stileman P. 2011. *Guidance Note 1 – Bats in the Context of Tree Work Operations.* Arboricultural Association. ISBN 0900978546

Strouts B and Winter T. 2013. *Diagnosis of Ill-Health in Trees, 2nd Edition*. Arboricultural Association. ISBN 0900978589

Watson G. and Green T. 2011. *Fungi on Trees: An Arborists' Field Guide*. Arboricultural Association ISBN 0900978554

### *Journals and magazines*

Arborist News

Essential Arb

Forestry Journal

Journal of Arboriculture

Quarterly Journal of Forestry

The Arb Magazine

### *Websites*

| | |
|---|---|
| The Arboricultural Association | http://www.trees.org.uk/ |
| The Forestry Commission | http://www.forestry.gov.uk |
| The International Society of Arboriculture | http://isaarboriculture.co.uk/ |

# Appendix 1 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training Providers homepage** on **www.cityandguilds.com**.

## City & Guilds Centre Manual

This document provides guidance for organisations wishing to become City & Guilds approved centres, as well as information for approved centres delivering City & Guilds qualifications. It covers the centre and qualification approval process as well as providing guidance on delivery, assessment and quality assurance for approved centres.

It also details the City & Guilds requirements for ongoing centre and qualification approval, and provides examples of best practice for centres. Specifically, the document includes sections on:

- the centre and qualification approval process
- assessment, internal quality assurance and examination roles at the centre
- registration and certification of candidates
- non-compliance and malpractice
- complaints and appeals
- equal opportunities
- data protection
- management systems
- maintaining records
- internal quality assurance
- external quality assurance.

## Our Quality Assurance Requirements

This document explains the requirements for the delivery, assessment and awarding of our qualifications. All centres working with City & Guilds must adopt and implement these requirements across all of their qualification provision. Specifically, this document:

- specifies the quality assurance and control requirements that apply to all centres
- sets out the basis for securing high standards, for all our qualifications and/or assessments
- details the impact on centres of non-compliance

The **centre homepage** section of the City & Guilds website also contains useful information on

- **Walled Garden**: how to register and certificate candidates on line
- **Events**: dates and information on the latest Centre events
- **Online assessment**: how to register for e-assessments.

# Useful contacts

| | |
|---|---|
| **UK learners**<br>General qualification information | **E: learnersupport@cityandguilds.com** |
| **International learners**<br>General qualification information | **E: intcg@cityandguilds.com** |
| **Centres**<br>Exam entries, Certificates, Registrations/enrolment, Invoices, Missing or late exam materials, Nominal roll reports, Results | **E: centresupport@cityandguilds.com** |
| **Single subject qualifications**<br>Exam entries, Results, Certification, Missing or late exam materials, Incorrect exam papers, Forms request (BB, results entry), Exam date and time change | **E: singlesubjects@cityandguilds.com** |
| **International awards**<br>Results, Entries, Enrolments, Invoices, Missing or late exam materials, Nominal roll reports | **E: intops@cityandguilds.com** |
| **Walled Garden**<br>Re-issue of password or username, Technical problems, Entries, Results, e-assessment, Navigation, User/menu option, Problems | **E: walledgarden@cityandguilds.com** |
| **Employer**<br>Employer solutions, Mapping, Accreditation, Development Skills, Consultancy | **E: business@cityandguilds.com** |



If you have a complaint, or any suggestions for improvement about any of the services that we provide, email: **feedbackandcomplaints@cityandguilds.com**

## About City & Guilds

As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. City & Guilds is understandd and respected by employers across the world as a sign of quality and exceptional training.

## City & Guilds Group

The City & Guilds Group is a leader in global skills development. Our purpose is to help people and organisations to develop their skills for personal and economic growth. Made up of City & Guilds, City & Guilds Kineo, The Oxford Group and ILM, we work with education providers, businesses and governments in over 100 countries.

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