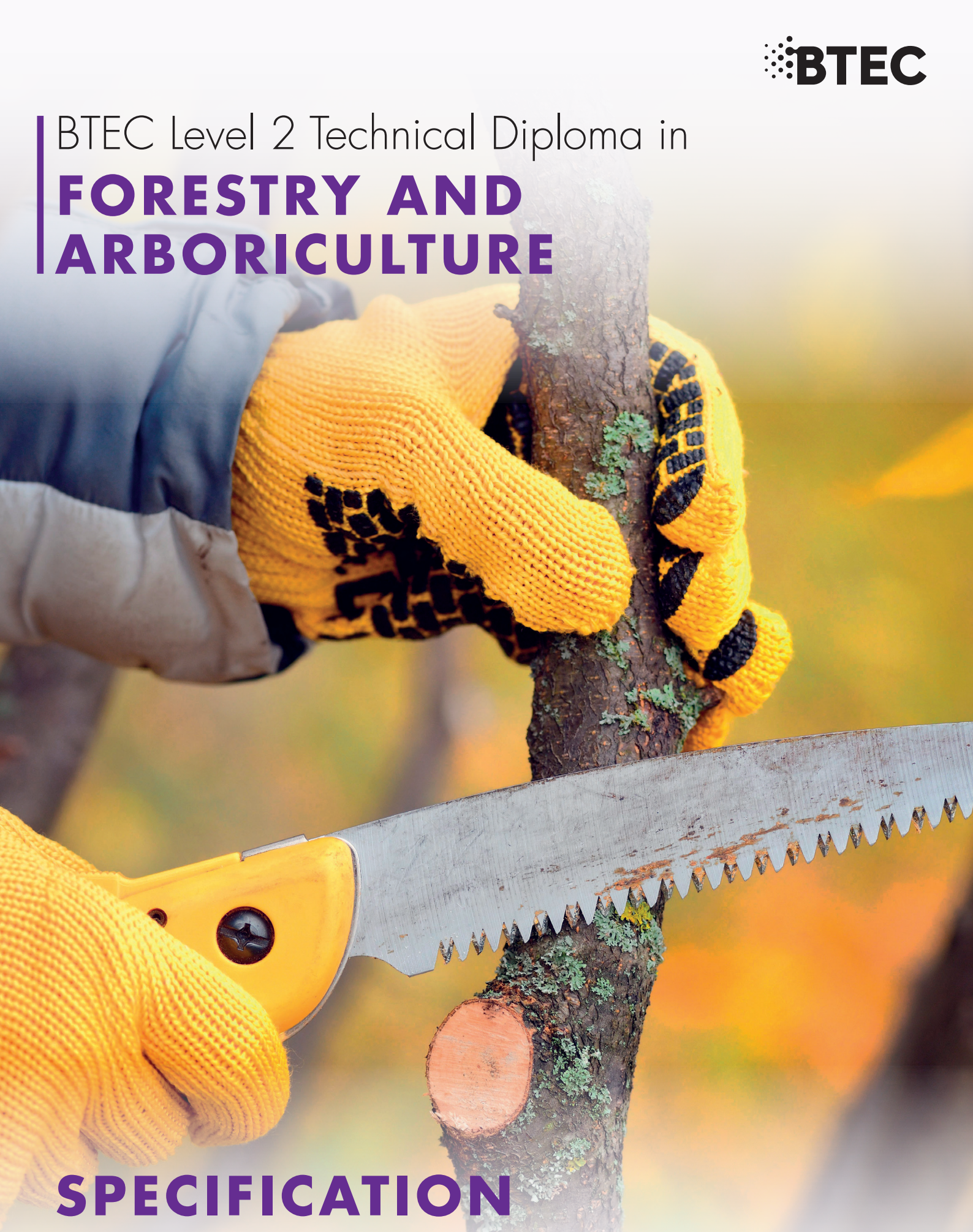
BTEC

BTEC Level 2 Technical Diploma in

FORESTRY AND ARBORICULTURE



SPECIFICATION

First teaching: September 2018 | First certification: Summer 2019

ISSUE 3

Pearson

Pearson BTEC Level 2 Technical Diploma in Forestry and Arboriculture

Specification

First teaching September 2018
Issue 3

Edexcel, BTEC and LCCI qualifications

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About Pearson

Pearson is the world's leading learning company, with 35,000 employees in more than 70 countries working to help people of all ages to make measurable progress in their lives through learning. We put the learner at the centre of everything we do, because wherever learning flourishes, so do people. Find out more about how we can help you and your learners at qualifications.pearson.com

This specification is Issue 3. Key changes are listed in the summary table on the page after next of the document. We will inform centres of any changes to this issue. The latest issue can be found on the Pearson website: qualifications.pearson.com

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Welcome

With a track record built over 30 years of learner success, BTEC qualifications are widely recognised and respected. They provide progression to the workplace, either directly or via study at higher levels. Proof comes from YouGov research, which shows that 62% of large companies have recruited employees with BTEC qualifications.

Why are BTECs so successful?

BTECs embody a fundamentally learner-centred approach to the curriculum, with a flexible, unit-based structure. In these new BTEC Level 2 Technicals, the focus is on the development of technical, practical and transferable work-related skills, and sector-specific knowledge. The development of these skills is key for learners to progress to work or to an Apprenticeship.

When creating the BTEC Level 2 Technicals, we worked with employers to ensure that the qualifications meet their needs. Employers are looking for recruits with the appropriate technical knowledge, and technical and transferable skills essential for employment.
The BTEC Level 2 Technicals meet these requirements through:

- a range of occupationally-related qualifications, each with a clear purpose, so that there is a qualification to suit each learner's plan for career progression
- up-to-date content that is closely aligned with employers' needs for a skilled future workforce
- assessments chosen to help learners progress to the next stage. This means that all assessments are set by the centre to meet local needs. This ensures that there is a core of skills and understanding common to all learners.

We provide a wealth of support, both resources and people, to ensure that learners and their tutors have the best possible experience during their course. See *Section 10 Resources and support* for details of the support we offer.

A word to learners...

BTEC Level 2 Technicals will demand a lot of practical work from you. You will need to:

- complete a range of units
- be organised
- take some assessments that Pearson will set and mark
- take other assessments that will demonstrate your technical and practical skills
- keep a portfolio of your assignments.

But you can feel proud to achieve a BTEC because, whatever your plans in life – whether you decide to go on to work or to an Apprenticeship – success in your BTEC Level 2 Technical qualification will help you to progress to the next stage in your life.

Good luck, and we hope you enjoy your course.

Collaborative development

Learners completing their BTEC Level 2 Technicals will be aiming to go on to employment or to an Apprenticeship. It was essential, therefore, that we developed these qualifications in close collaboration with experts from professional bodies and businesses, and with the providers who will be delivering the qualifications. We are grateful to all the further education lecturers, tutors, employers, professional body representatives and other individuals who have generously shared their time and expertise to help us develop these new qualifications.

Employers, professional bodies and further education providers that have worked with us include the *Forestry Commission*.

In addition, professional bodies and businesses have provided letters of support confirming that these qualifications meet their recruitment requirements. These letters can be viewed on our website.

Summary of Pearson BTEC Level 2 Technical Diploma in Forestry and Arboriculture specification Issue 3 changes

Summary of changes made between the previous issue and this current issue	**Page number**
Unit 1: Introduction to Working in Land-based Industries and *Unit 2: Introduction to Plant and Soil Science* have been changed from being externally-assessed to being internally-assessed.	Pages 11-37
The wording in *Section 7 Teacher/centre malpractice* has been updated to clarify suspension of certification in certain circumstances.	Pages 114, 115
The wording under *Section 9 Understanding the qualification grade* has been updated to clarify current practice in ensuring maintenance and consistency of qualification standards.	Page 119

Contents

Pearson BTEC Level 2 Technicals

Introduction

BTEC Level 2 Technicals are intermediate qualifications for post-16 learners who want to specialise in a specific occupation, occupational area or technical role. They prepare learners for work or an Apprenticeship by giving them the opportunity to develop sector-specific knowledge, technical and practical skills, and to apply these skills in work-related environments. The qualifications also provide progression to Level 3 Tech Level qualifications.

Developed in close conjunction with leading employers, BTEC Level 2 Technicals develop transferable workplace skills, such as good communication and the ability to work in a team, which employers have identified as essential for gaining employment in the sector and for progression once the learner is working.

At the core of these qualifications is the concept of preparing young people for the working world. Through practical activities and occupationally fit-for-purpose assessments, learners will gain the skills and behaviours needed for sustainable employment.

BTEC Level 2 Technicals are designed to be used flexibly, depending on their size and scope:

- as part of a full-time 16–19 study programme, alongside mathematics and English GCSEs and/or Functional Skills, work placement and enrichment activities
- as the technical qualification within an Apprenticeship or off-the-job training for those already in work
- as a roll-on, roll-off programme for those entering an Apprenticeship or employment.

These qualifications are not eligible for performance tables in England.

This specification contains the information you need to deliver the Pearson BTEC Level 2 Technical Diploma in Forestry and Arboriculture (QN 603/2719/4). The specification signposts you to additional handbooks and policies. It includes all the units for this qualification.

1 Pearson BTEC Level 2 Technical Diploma in Forestry and Arboriculture

Purpose

Who is the qualification for?

This qualification is for you if you want to start a career in the forestry and arboriculture sector. It is designed for post-16 students and can be taken as part of a wider study programme. It is an ideal qualification if you are intending to progress directly to employment in forestry and arboriculture or to a forestry and arboriculture Apprenticeship.

What does the qualification cover?

This qualification has been developed in consultation with employers in the forestry and arboriculture sector to ensure that you learn the skills and behaviours that will give you the best opportunity to be successful when applying for work.

There are seven mandatory units that relate directly to the skills, knowledge and behaviours expected by employers in the forestry and arboriculture sector. The areas you will cover are:

- an introduction to working in land-based industries
- an introduction to plant and soil science
- a tree work placement
- tree-felling and ground-based operations
- assisting tree climbing and pruning operations
- the ecology of trees, woods and forests
- practical tree work skills.

You will also enhance your broader skills in literacy and numeracy, which will support progression in other areas. In addition, you will develop transferable technical and practical skills in communication (working with colleagues, customers and clients), and research and project work, giving you an opportunity to demonstrate your reflective practice by suggesting alternative approaches to a problem.

What could this qualification lead to?

Achieving this qualification will give you an advantage when applying for a job in forestry and arboriculture. The types of jobs you will be ready for are:

- forest worker
- ground worker.

When studied as part of a full study programme, this qualification will also give you a sound basis to progress further within the forestry and arboriculture sector to a Level 3 qualification, such as the Pearson BTEC Level 3 National Diploma in Forestry and Arboriculture.

About the forestry and arboriculture sector

In the UK, there are currently more than 4,500 arboriculture businesses, employing around 24,000 people; and more than 3,000 forestry businesses, employing almost 20,000 people. This sector contributes more than £286 million to the UK economy.

The forestry industry is wide ranging and global in its influence and impact, from managing small community woodlands to dealing with issues of massive deforestation. The arboriculture industry is concerned with the care and maintenance of trees grown for amenity purposes, such as those growing in parks and gardens, street and highways, and also for trees in special collections.

2 Structure

Total Qualification Time (TQT)

For all regulated qualifications, Pearson specifies a total number of hours that it is estimated learners will require to complete and show achievement for the qualification: this is the Total Qualification Time (TQT). Within TQT, Pearson identifies the number of Guided Learning Hours (GLH) that we estimate a centre delivering the qualification might provide. Guided learning means activities such as lessons, tutorials, online instruction, supervised study and giving feedback on performance, that directly involve tutors and assessors in teaching, supervising and invigilating learners.

In addition to guided learning, other required learning directed by tutors or assessors will include private study, preparation for assessment and undertaking assessment when not under supervision, such as preparatory reading, revision and independent research.

The Pearson BTEC Level 2 Technical Diploma in Forestry and Arboriculture is a qualification that has:

- Total Qualification Time: 530 hours
- Guided Learning: 360 hours.

Centres should take note of these hours in planning their programme but should also use their professional judgement to determine the provision of guided learning and study time across the units.

Qualification structure

Learners are required to complete and achieve all the units included in this qualification.

Pearson BTEC Level 2 Technical Diploma in Forestry and Arboriculture				
Unit number	**Unit title**	**GLH**	**Type**	**How assessed**
1	Introduction to Working in Land-based Industries	**60**	Mandatory	Internal
2	Introduction to Plant and Soil Science	**60**	Mandatory	Internal
3	Tree Work Placement	**60**	Mandatory	Internal
4	Tree Felling and Ground-based Operations	**60**	Mandatory	Internal
5	Assisting Tree Climbing and Aerial Pruning Operations	**30**	Mandatory	Internal
6	Ecology of Trees, Woods and Forests	**30**	Mandatory	Internal
7	Practical Tree Work Skills	**60**	Mandatory	Internal Synoptic

This qualification has 100% mandatory content.

These qualifications are not eligible for performance tables in England.

Qualification and unit content

Pearson has developed the content of this qualification in collaboration with employers and representatives from relevant professional bodies and further education providers. In this way, we have ensured that content is up to date and that it includes the knowledge, technical and practical skills and behaviours required to work in the sector and occupational area.

All units in this qualification are mandatory, which provides a balance of breadth and depth, ensuring that all learners develop the technical and practical skills required in the occupational area. Learners are then given the opportunity to develop a range of transferable skills and attributes expected by employers. It is expected that learners will apply their learning to relevant employment and sector contexts during delivery, and that they will have opportunities to engage meaningfully with employers.

BTECs have always required applied learning that brings together knowledge and understanding (the cognitive domain) with practical and technical skills (the psychomotor domain). This is achieved through learners performing practical, work-related tasks that encourage the development of appropriate work-related behaviours (the affective domain) and transferable skills. Transferable skills are those such as communication, teamwork, planning and completing tasks to a high standard, all of which are valued in the workplace.

Our approach provides rigour and balance and promotes the ability to apply learning immediately in new contexts.

Some of the units in the specification may contain references to legislation, policies, regulations and organisations, which may not be applicable in the country you deliver this qualification in (if teaching outside of England), or which may have gone out of date during the lifespan of the specification. In these instances, it is possible to substitute such references with ones that are current and applicable in the country you deliver this qualification in, subject to confirmation by your Standards Verifier.

Assessment

Assessment is designed to fit the purpose and objective of the qualification. It includes a range of assessment types and styles suited to skills and occupationally-based qualifications at this level.

Internal assessment

Units 1, 2, 3, 4, 5, 6 and 7 are assessed through internal assessment. Internal assessment allows learners to apply technical knowledge and demonstrate mastery of practical and technical skills through realistic tasks and activities. This style of assessment promotes deep learning through ensuring the connection between knowledge and practice.

Internal assessment is through assignments that are subject to external standards verification. We provide suggestions in each unit for setting assignments. This means that you can adapt materials to your local contexts and assess assignments that provide the valid and rigorous final assessment for each unit.

You will make grading decisions based on the requirements and supporting guidance given in the units. Learners must achieve all the internally-assessed units at Pass grade or above to achieve the qualification. For further information on internal assessment, including resubmissions, see *Section 6 Internal assessment*.

Synoptic internal assessment

There is one internally-assessed unit that provides the main synoptic assessment for this qualification. This synoptic assessment is designed to take place towards the end of the programme and draws on the learning throughout. The design of this assessment ensures that there is sufficient stretch and challenge, enabling the assessment of sector-related knowledge and technical and practical skills at the end of the learning period.

The synoptic assessment for this qualification is used to assess *Unit 7: Practical Tree Work Skills*, and takes the form of a practical demonstration of an outdoor tree establishment and maintenance duties project that requires learners to consider and select content that will enable them to apply their knowledge and skills from Units 1, 2, 3, 4, 5 and 6 in an integrated way to a realistic work situation. For Unit 7, learners will carry out the practical selection, use and storage of tools and equipment to prepare sites, establish and maintain trees. This draws together underpinning knowledge of maintenance methods and techniques, along with the practical skills of planting and pruning in different situations.

Learners will approach their (mostly outdoor) tree work duties project having completed their study of key land-based working practices and essential plant and soil science in *Unit 1: Introduction to Working in Land-based Industries* and *Unit 2: Introduction to Plant and Soil Science*. They will utilise the skills of practical planting and pruning and use of tree work tools and equipment as developed in *Unit 4: Tree Felling and Ground-based Operations*, as well as the practical skills needed to assist others in forestry and arboricultural work at height through their learning from *Unit 5: Assisting Tree Climbing and Aerial Pruning Operations*. Learners' completion of real-life working, as required by *Unit 3: Tree Work Placement*, means they will utilise their skills of working with and around trees. Learners will also be able to apply their understanding of tree ecology from *Unit 6: Ecology of Trees, Woods and Forests*.

In delivering the synoptic unit, you need to encourage learners to draw on their broader learning so that they are prepared for the assessment.

Language of assessment

Assessment of the internally-assessed units for this qualification will be available in English. All learner work must be in English. A learner taking the qualification may be assessed in British Sign Language where it is permitted for the purpose of reasonable adjustment. For information on reasonable adjustments see *Section 7 Administrative arrangements*.

Grading of the qualification

Achievement in the qualification requires a demonstration of depth of study in each unit, assured acquisition of the practical skills required for employment in the specific sector and successful development of transferable skills.

Units are assessed using a grading scale of Distinction, Merit, Pass and Unclassified. All units in the qualification contribute proportionately to the overall qualification grade.

The qualification is graded using a scale of PP to DD. Please see *Section 9 Understanding the qualification grade* for more details.

The relationship between qualification grading scales and unit grades will be subject to regular review as part of Pearson's standards monitoring processes on the basis of learner performance and in consultation with key users of the qualification.

Employer involvement

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 learners, and furthers collaboration between the learning and skills sector and industry.

You need to ensure that all learners have the opportunity to undertake meaningful activity involving employers during their course.

Examples of 'meaningful activity' include:

- structured work experience or work placements that develop skills and knowledge relevant to the qualification/industry
- project(s), exercise(s) and/or assessment(s)/examination(s) set with input from industry practitioner(s)
- units delivered or co-delivered by an industry practitioner(s); this could take the form of masterclasses or guest lectures
- industry practitioners operating as 'expert witnesses' who contribute to the assessment of a learner's work of practice, operating within a specified assessment framework; this may be a specific project(s), exercise(s) or all assessments for a qualification.

Meaningful employer involvement, as defined above, must be with employers from the land-based sector and should contribute significantly to at least one mandatory unit.

For this qualification, the following unit has specified mandatory requirements for employer involvement in delivery and assessment:

- *Unit 3: Tree Work Placement* – the assessment for this unit must take place in a real work environment. Learners must have a work placement to facilitate this assessment. Please see the unit for information on the requirements for work placement.

In all the units we have also provided suggestions on how employers could become involved in the delivery and/or assessment of this qualification.

These are suggestions only and there will be other possibilities at local level. Centres may choose to use other approaches but must ensure that they meet the requirement for meaningful employer involvement as defined above. Centres must have an employer involvement plan in place at the start of the programme. It must detail their approach to employer involvement and how it will add value to the delivery and assessment of the qualification.

Each centre's approach to employer involvement will be monitored in two ways. It will be monitored at centre level as part of the annual quality-management review process and captured as part of the standards verification process that addresses centre strategy for delivery, assessment and quality assurance, when we will ask you to show evidence of how employer involvement is provided for all learners. You will need to show evidence in order to gain reporting clearance for certification. It will also be monitored at programme level as part of the standards verification process to confirm that plans for employer involvement meet the requirements of the specification. These approaches are designed to ensure that additional activities can be scheduled where necessary so that learners are not disadvantaged, see *Section 8 Quality assurance*.

3 Units

Understanding your units

The units in this specification set out our expectations of assessment in a way that helps you to prepare your learners for assessment. The units help you to undertake assessment and quality assurance effectively.

Each internal unit in the specification is set out in a similar way.

This section explains how the units work. It is important that all tutors, assessors, internal verifiers and other staff responsible for the programme read and are familiar with the information given in this section.

Internally-assessed units

Section	Explanation
Unit number	The number is in a sequence for the qualification.
Unit title	This is the formal title of the unit and appears on certificates.
Level	All units are at Level 2 on the national framework.
Unit type	This says if the unit is mandatory or optional for the qualification. See *Section 2 Qualification structure* for details.
Assessment type	This says how the unit is assessed – i.e. whether it is internal or synoptic internal. See *Section 2 Qualification structure* for details.
GLH	Units have a GLH value of 30 and 60. This indicates the numbers of hours of teaching, directed activity and assessment expected. It also shows the weighting of the unit in the final qualification grade.
Unit in brief	A brief formal statement on the content of the unit that is helpful in understanding its role in the qualification. You can use this in summary documents, brochures etc.
Unit introduction	This is designed with learners in mind. It indicates why the unit is important, how learning is structured and how learning might be applied when progressing to employment or higher education.
Learning aims	These help to define the scope, style and depth of learning of the unit. You can see where learners should be developing and demonstrating their skills or where they should be actively researching or reviewing.
Unit summary	This section helps tutors to see at a glance the main content areas against the learning aims and the structure of the assessment. The forms of evidence given are suitable to fulfil the requirements.
Content	This section sets out the required teaching content of the unit. Content is compulsory except when shown as 'e.g.'. Learners should be asked to complete summative assessment only after the teaching content for the unit or learning aim(s) has been covered.

Section	Explanation
Assessment criteria	Each learning aim has assessment criteria to explain the achievement required to obtain Pass, Merit and Distinction grades.
Essential information for assessment decisions	This information gives guidance for each learning aim or assignment of the expectations for Pass, Merit and Distinction standard. This section contains examples and essential clarification. It is important that this is used carefully alongside the assessment criteria.
Assessment activity	This section provides information, suggested scenarios and tasks for summative assessment activities.
Further information for tutors and assessors	This section gives you information to support the delivery and assessment of the unit.
Delivery guidance	This section offers suggestions of ways of delivering the unit. It offers ideas on practical activities in a sector context that can be used to help develop relevant skills and to encourage progress.
Essential resources	Any specific resources that you need to be able to teach and assess are listed in this section. For information on support resources see *Section 10 Resources and support*.
Links to other units	This section shows you the main relationships of units to other units. This can help you to structure your programme and make the best use of available materials and resources.
Employer involvement	This section gives you information on the units that can be used to involve learners with employers. This information will help you to identify the kind of involvement that is likely to be successful.

Units

This section contains all the units developed for this qualification.

Unit 1: Introduction to Working in Land-based Industries

Level: **2**

Unit type: **Mandatory**

Assessment type: **Internal**

Guided learning hours: **60**

Unit in brief

In this unit, learners will develop their knowledge and understanding of factors that influence working practices within land-based industries.

Unit introduction

In this unit, you will learn about key job roles in land-based industries and the exciting activities these include. You will consider how laws and other important guidance ensure that working in land-based industries is safe and puts workers' needs first. You will look at how land-based industries can diversify by offering new products and services to the public and different ways in which land-based industries can increase their sustainability by reducing the impacts they have on the environment.

In this unit, you will learn about the professional behaviour and conduct to use when working in land-based industries and the health and safety legislation that affects the way we work within the land-based industries. In order to work at an operational level within these industries, it is essential you have the knowledge and understanding to apply safe and professional working to different situations.

The land-based industries are based on traditional occupations and in order to succeed in this area you need to be able diversify to utilise opportunities, while also being considerate to the environment. You will learn about diversification and sustainability to give you the knowledge and understanding required for this and to enable you to work responsibly to protect the environment.

Learning aims

A Investigate working in the land-based sector

B Carry out safe working in the land-based sector

C Demonstrate responsible environmental working practices.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Investigate working in the land-based sector	**A1** Land use **A2** Diversification in land-based Industries **A3** Key job roles by industry	A written report including case studies Photographic/video evidence of learners carrying out land-based tasks in a safe and environmentally responsible manner, supported by observation records. Learners will also need to include reflections on safe and environmentally responsible working practices.
B Carry out safe working in the land-based sector	**B1** Fundamentals of working safely **B2** Working safely	
C Demonstrate responsible environmental working practices	**C1** Waste Management **C2** Sustainability **C3** Environmental responsibilities	

Key teaching areas in this unit include:

Sector skills	Knowledge	Transferable skills/behaviours
• Identification of land use types • Correct selection and use of tools, equipment, materials and PPE to ensure safe working	• Health and Safety legislation • Waste management legislation and codes of practice	• Developing practical and technical skills • Working with others • Problem solving • Self-management and development

Unit content

Knowledge and sector skills

Learning aim A: Investigate working in the land-based sector

A1 Land use

Understand the features and characteristics that influence land use.

- Land-based industries including: agriculture, horticulture, forestry and arboriculture, water supply, mineral extraction.
- The social, ecological and aesthetic use and values of the landscape, including:
  - managing landscapes
  - maintaining countryside character
  - preserving and protecting rural landscapes
  - reducing pollution
  - protecting wildlife
  - reducing flood risk
  - recreation, transport.

A2 Diversification in land-based industries

Purposes, advantages and disadvantages of diversification.

- Opportunities for land-based businesses:
  - sport and leisure, e.g. mountain biking, walking, hiking, climbing, paintballing, off-road vehicles, water sports, angling, golf, shooting, canine and equine activities
  - tourism, e.g. country houses and gardens, camping/glamping, farm parks, retail and food, tea shops, gift shops
  - energy production, e.g. biofuel, wind and solar farms
  - education, e.g. school activity holidays/centres, rural crafts, environmental awareness and
  - conservation strategies.
- Implementation of diversification:
  - planning considerations, e.g. access, impact on local services, aesthetic/environmental impacts
  - sources of funding, e.g. government schemes, commercial partnerships, private investment, charitable grants.

A3 Key job roles by industry

- Understanding the skills, qualifications, key responsibilities required, and career pathways and progression for different types of jobs, within the relevant land-based industry.
  - Agriculture, e.g. stock/herdsperson, farm worker, crop technician, machinery operator
  - Countryside, e.g. park ranger, education officer, estates officer, game keeper, water bailiff
  - Horticulture, e.g. greenkeeper, grounds person, nursery worker, garden centre assistant, gardener, landscaper
  - Forestry and Arboriculture, e.g. arborist, tree surgeon, ground maintenance operative, plant operator, forest craftsman.

Learning aim B: Carry out safe working in the land-based sector

B1 Fundamentals of working safely

Understand the essential principles of safe working in land-based environments and the extent to which care can be given in emergency scenarios.

- Working safely with machines, chemicals, livestock and equipment:
  - following policies and procedures
  - promoting safe working and healthy conditions
  - assessing risks
  - undertaking safety training.
- Appropriate actions, reporting procedures and legal responsibilities for accident and emergency situations:
  - lines of reporting (supervisor, manager, healthcare professional, emergency services)
  - common accident scenarios and their responses e.g. shock, cuts, bleeding, fracture, burns, poisoning, stings/bites, road traffic accident, severe allergies, tourniquets, splinting, large wounds)
  - initial and follow-up responses to chemical spills or ingestion, fire, disease outbreak, escape of livestock.
- Basic first-aid principles:
  - aims of first aid and how to apply it in different situations e.g. prevent further harm, relieve pain, promote recovery, protect the unconscious
  - legal limitations and implications of first aid
  - key contents of first-aid box e.g. bandages, dressings, surgical tape, cotton wool, towel, scissors, disposable gloves, tweezers; personal first-aid kit with large wound dressing.

B2 Working safely

Procedures and requirements for working safely while carrying out tasks, including relevant responsibilities of employers and employees when working in land-based industries.

- Responsibilities of employers and employees for maintaining health and safety including the role of the Health and Safety Executive.
- Current relevant legislation and codes of practice.
- Using risk assessments.
- Dynamic risk assessment while working.
- Additional risks associated working in the land-based sectors to include:
  - lone working
  - working near water
  - working with animals; animal health and their transport
  - slurry pits
  - farm machinery.
- Purpose, selection, pre-use checks and use of personal protective equipment (PPE) according to task including:
  - eye/face e.g. goggles, safety glasses, visor, full face shield
  - head e.g. full face shield, hard hat
  - ear protection e.g. earplugs, earmuffs
  - hand protection e.g. padded gloves, rubber gloves, heavy duty gloves, chainsaw gloves
  - protective clothing e.g. overalls, reflective safety clothing, chainsaw trousers, chemical resistant coveralls/aprons)

- protective footwear e.g. latex/rubber footwear, steel toe-capped boots, chainsaw boots
- respiratory protection, dust masks
- working at height safety equipment e.g. harnesses and ropes.

- Health and safety signs and symbols relevant to the UK including the UK Health and Safety Executive, International Organization for Standardization (ISO):
  - mandatory e.g. wear protective footwear, protective clothing, eye protection, hand protection, ear protection, head protection, face mask, respirator
  - prohibition e.g. no admittance to unauthorised personnel, not drinking water, do not run, do not enter, no naked flames
  - safe condition e.g. first aid, fire exit, emergency shower, emergency eye wash, emergency stop, disabled refuge point, assembly point
  - fire equipment e.g. fire alarm, fire hydrant, fire hose reel, fire extinguisher
  - warning e.g. general warning, electricity, hot surface.

Learning aim C: Demonstrate responsible environmental working practices

C1 Waste management

The main features, purpose and legislative requirements of waste management including:

- Principles of managing waste and the waste hierarchy and pyramid of recycling, including: disposal, energy from waste, 3 Rs – Reduce, Reuse, Recycle.
- Categories of controlled waste, including solid waste, liquid waste and hazardous waste e.g. asbestos, chemicals, batteries, solvents, pesticides, oils, clinical.
- Methods of dealing with different types of waste, for example use of colour coding or other methods of segregating.
- Recycling opportunities and activities:
  - composting of organic materials
  - irrigating using grey water
  - recycling of used plastic in the industry e.g. bale wrap, crop cover.
- UK Health and Safety Executive hazard pictograms relevant to waste management:
  - toxic material, oxidising material, hazardous to the environment, flammable materials, corrosive, irritant, explosive material, slippery surface.
- Current legislation regarding waste management e.g. use of waste management hierarchy, consideration of waste management options, declaration that waste management hierarchy has been considered including versions by UK country.
- Documents associated with waste management and disposal documents e.g. Duty of Care: Waste Transfer Notes, Hazardous Waste Consignment note, waste exemptions.
- Areas that require special care: Nitrate Vulnerable Zones (NVZs), groundwater Source Protection Zones (SPZs).

C2 Sustainability

Key principles of sustainability, benefits and disadvantages of utilising sustainable practices in land-based businesses.

- The 3 Ps of sustainability: people, planet, profit.
- Understanding 'carbon footprint' and carbon footprint assessment to:
  - reduce fuel consumption
  - conserve energy resources
  - facilitate carbon sequestration.
- Calculate basic carbon footprint/sequestration.

- Financial, environmental, health and political benefits and disadvantages to adopting sustainable practices.
- Activities and practices that may increase sustainability and/or reduce reliance on natural resources:
  - solar and wind farms
  - production of biofuels
  - short rotation coppice, soil management
  - production forecasting and sustainable yield management in forestry
  - reductions and efficiencies in water, energy use, oil and fossil fuel use
  - organic farming.

C3 Environmental responsibilities

Potential and probable impacts of land use, land-based practices and mitigating actions to protect the environment.

- Intensive farming systems and responsible use of medications and chemicals.
- Forestry including use of exotic species, monoculture.
- Urban and transport network development, use of land for recreation.
- Causes and consequences of loss, fragmentation or removal of habitats:
  - boundary removal
  - introduction and spread of non-native invasive plant and animal species
  - food production
  - reduced biodiversity
  - wetland drainage.
- Advantages and disadvantages of adopting environmentally responsible practices.
- Use of Environmental Impact Assessments.

Transferable skills

Developing practical and technical skills

- Demonstrate techniques/skills/processes.
- Use equipment safely and appropriately.

Self-management and development

- Working in a professional environment.
- Planning own time.
- Reviewing own progress.
- Working under pressure to meet professional deadlines.
- Thinking skills/adaptability.

Working with others

- Listening and working as a team.

Problem solving

- Carrying out practical tasks.
- Identifying and choosing the right equipment.

Assessment criteria

Pass	Merit`	Distinction
Learning aim A: Investigate working in the land-based sector		
A.P1 Identify land use in a given context.	**A.M1** Describe factors affecting land use and job roles in a given context.	**A.D1** Evaluate land use and job roles in a given context.
A.P2 List job roles in land use in a given context.		
Learning aim B: Carry out safe working in the land-based sector		
B.P3 Carry out safe working practices when carrying out work in a land-based environment.	**B.M2** Carry out and explain the reasons for safe working practices in a land-based environment.	**B.D2** Carry out and assess the importance of safe working practices in a land-based environment.
Learning aim C: Demonstrate responsible environmental working practices		
C.P4 Carry out waste management practices to demonstrate some environmental awareness.	**C.M3** Demonstrate and explain the reasons for environmentally responsible and sustainable working practices.	**C.D3** Demonstrate and assess the importance of responsible environmental working practices on the environment.
C.P5 Outline sustainable and environmentallty responsible working practices.		

Essential information for assessment decisions

Learning aim A

For distinction standard, learners will:

- use findings and own observation to comprehensively report on the features, characteristics and values, of different land uses and connected job roles within their chosen sector. Learners will cover a minimum of three specific land uses. They will include informed references to diversification fora minimum of three land-based industries in their chosen sector, citing advantages and disadvantages for each. They will justify the relationships between these land uses, related job roles and associated diversified activities by providing sound reasons and further possibilities for diversification in the land-based industries they are covering.

For merit standard, learners will:

- use findings and own observations to describe the features, characteristics and values, of different land uses and connected job roles within their chosen sector. They will cover a minimum of three specific land uses. Learners will include some references to diversification in a minimum of three land-based industries in their chosen sector. Learners will give some reasons for the relationships between these land uses, related job roles and associated activities.

For pass standard, learners will:

- use findings, own observations and research and provide a summary of the features, characteristics and values, of a minimum of three different land uses including for each an example of one appropriate job and one example of diversification within their chosen sector.

Learning aims B

For distinction standard, learners will:

- carry out three specified tasks safely, fully adhering to relevant safety legislation and procedures. They consistently ensure the health and safety of self and others. They routinely assess the risks before and while they are carrying out the work. They consistently check and use relevant personal protective equipment as the work requires. They determine the importance of safe working practices by justifying why they worked in this way and what would happen with non-adherence to safety.

For merit standard, learners will:

- carry out three specified tasks safely, adhering to relevant legislation and procedures, most of the time. They work in a safe manner to ensure safety of self and others most of the time. They check and use relevant personal protective equipment most of the time. They give reasons for safe working practices.

For pass standard, learners will:

- carry out three specified tasks They work in a safe manner to ensure safety of self and others but may need prompting in order to do so. They use Personal protective equipment but may need prompting in selecting the relevant equipment.

Learning aims C

For distinction standard, learners will:

- adopt consistent, sustainable and environmentally responsible working practices. They always, dispose of waste safely and correctly, fully abiding to the principles, waste hierarchy and pyramid of recycling of waste management. They show full awareness of environmental responsibility while working, by taking mitigating actions to protect the environment. They determine the importance of environmental responsibility by justifying why they have worked in a certain way as well as the disadvantages to the environment should they not.

For merit standard, learners will:

- adopt sustainable and environmentally responsible working practices. They dispose of waste safely by abiding by the principles, waste hierarchy and pyramid of recycling of waste management most of the time. They show awareness of environmental responsibility most of the time, while working, by taking some actions to protect the environment. They determine the importance of environmental responsibility by justifying why they have worked in a certain way.

For pass standard, learners will:

- carry out the three tasks showing some concern for the sustainability and awareness for the environment. They dispose of waste showing some awareness of the principles, waste hierarchy and pyramid of recycling of waste management. They outline a minimum of three environmental working practices which may not be related to their tasks.

Assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity. *Section 6* gives information on setting assignments and there is further information on our website.

A suggested structure for summative assessment is shown in the *Unit summary* section, along with suitable forms of evidence. This is for illustrative purposes only and can therefore be adapted to meet local needs or to assess across units where suitable opportunities exist. The information in the *Links to other units* section will be helpful in identifying opportunities for assessment across units.

The following scenario could be used produce the required evidence for this unit. Centres are free to use comparable scenarios or other forms of evidence provided that it meets the assessment requirements of the unit.

Suggested scenario

You are working in a land-based sector and have been asked to identify what the land usage and related jobs are and how this can be diversified for the land to be used more profitably. You have also be asked to carry out three tasks which you need to ensure you do safely. You need to ensure that you consider sustainable and environmental practices while carrying out your work.

If a retake is necessary, an alternative example must be used. The following is an example of a retake assessment activity.

Three different tasks within the land-based sector must be used.

Further information for tutors and assessors

Delivery guidance

The following are examples of practical activities and workshops that tutors could use when developing sector and transferable skills in the delivery of this unit. Wherever possible, practical activities should be used to help learners develop both personal and sector skills in preparation for the final assessment. These suggestions are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

Tutor introduces the main concepts contained within the unit through a series of presentations, class-based activities and practical work. Case studies should be used and visits or field work could be considered.

The main concepts to be covered are:

- Types of land use. Using photographs, land use maps and field work, learners explore the range of land use and their characteristics.
- The 'value' of landscapes, for example, social, economic, recreational.
- Job roles. Learners consider the job roles associated with types of land use. The job roles may be specific, for example, farm manager, countryside warden or general, for example, animal transport driver, agricultural surveyor. Learners would benefit from guest speakers in this respect.
- Diversification. Learners should consider how land use changes and the factors that influence this change. Diversification in response to economic, social and environmental factors should be considered.
- Sustainability and environmentally responsible practice. Learners should understand the need for promoting and adopting working practice and waste management strategies that are both sustainable and environmentally sound. Reference to global issues, for example, climate change, and local issue, for example, river pollution or flood alleviation, should be made.
- The need for learners to work safely – all the time - is essential and tutors must emphasise that this encompasses a wide range of responsibilities to self, other people, animals and the environment.

Suggested time: about 8 hours.

Activity: Exploring land use

Learners should use maps, research, visits and personal experience to investigate three specific land uses. The land chosen should reflect the learner's own interest and sector, (for example, forestry, horticulture, arboriculture, countryside management). At least one of the land uses chosen should reference diversification. Examples of land use might include:

- Mixed lowland farm
- Forest Park
- Upland sheep farm.

For each land use, learners should provide a case study that explores the characteristics of the land use, the job roles specifically associated with the land use, and examples of sustainable and environmentally responsible practice. For diversification learners could examine specific examples, for the actual use of farm buildings for holiday lets or the potential for diversification.

Suggested time: about 8 hours.

Activity: Working Safely

Learners should be introduced to the need to work safely. Case studies could be used to illustrate the consequences of unsafe working and the high occurrence of incidents in the land-based industries.

The legal framework needs to be examined using examples of sector relevant current legislation together with the need to understand employer and employee responsibilities.

Learners should understand the purpose and use of prepared risk assessments and the need to monitor safe working while undertaking tasks (dynamic risk assessment). Tutors should also consider creating scenarios where immediate first aid is required. These can be reinforced while undertaking practical tasks.

Suggested time: about 8 hours.

Activity: Working with Waste

Learners should, through classroom-based instruction and practical tasks, become familiar with current licensing/regulations relating to waste disposal and that they can undertake practical waste disposal that is fully compliant.

Suggested time: about 8 hours.

Activity: Working Sustainably

Through classroom instruction and practical tasks, learners should understand the need to manage resources and the advantages and disadvantages of adopting sustainable working practices.

Learners should explore, at a variety of scales, methods and technologies that reduce the reliance on natural resources. Examples to illustrate this could include, large offshore wind farms, short rotation coppicing, conversion of methane to bio fuels.

Learners should undertake basic carbon footprint calculations, sequestration potentials

Suggested time: about 8 hours.

Activity: Working Responsibly

Through classroom instruction and practical tasks, learners should understand the need to manage the environment responsibly. Learners could investigate sector specific threats and the measures taken to mitigate environmental loss or damage, developing case studies to illustrate.

Learners should explore specific working practices that promote good environmental husbandry, for example:

- Scrub clearance to remove invasive plant species.
- Creation of flood alleviation dams on upland streams.
- Use of GIS (Geographic Information Systems) to target chemical applications on crops.

Suggested time: about 8 hours.

Activity: Practical Activities and Assessment

Tutors should ensure that learners undertake relevant, sector specific practical tasks to demonstrate they can:

- Work safely.
- Manage waste correctly.
- Adopt sustainable practices.
- Maintain good environmental standards.

Tutors could consider other areas of the programme that provide suitable learning and assessment opportunities, for example, work experience, practical units running concurrently.

Suggested time: about 14 hours.

Essential resources

For this unit, learners will need access to

- Suitable tools, materials and equipment to carry out practical tasks.

Links to other units

This unit draws on the knowledge and skills taught in:

- Unit 3: Countryside Work Placement
- Unit 4: Habitat Maintenance
- Unit 5: Countryside Access and Recreation
- Unit 6: Introduction to Game Management
- Unit 7: Land-based Machinery Operations
- Unit 8: Countryside Estate Maintenance.

Employer involvement

This unit would benefit from employer involvement in the form of:

- guest speakers
- design/ideas to contribute to unit assignment/case study/project materials
- work experience
- own business materials as exemplars
- support from local business staff as mentors.

Unit 2: Introduction to Plant and Soil Science

Level: **2**

Unit type: **Mandatory**

Assessment type: **Internal**

Guided learning hours: **60**

Unit in brief

Learners develop skills and knowledge to understand the importance of plant and soil science when working in land-based sectors.

Unit introduction

Plants really are amazing; they supply the oxygen we breathe, provide us with food and resources and enhance our beautiful landscapes over many years. Having a clear understanding of how plants grow, what they need to stay healthy and the role soil plays in their success is essential when working in any of the land-based sectors.

In this unit, you will learn just how amazing plants are and what they need to survive. You will explore internal structures of plants from cells to transport systems and external plant structures including stems, roots, leaves and flowers, looking at their functions and characteristics. You will also investigate soil types, texture, structure, pH, nutrients and care.

Whether you decide to gain employment in agriculture, horticulture, countryside, forestry and arboriculture or continue your study on to a level three qualification, understanding plant processes and soil requirements will be a huge advantage to your next steps.

Learning aims

A Investigate plant structure, growth and development

B Investigate plant life cycles and adaptations to the environment

C Investigate soil characteristics and effects on plant health.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Investigate plant structure, growth and development	**A1** Plant structure **A2** Plant processes	The learners will build a portfolio of evidence from working with given plant species and soil from a specified area, supplemented by practical laboratory work and/or producing models of cell structure.
B Investigate plant life cycles and adaptations to the environment	**B1** Plant growth and development **B2** Plant adaptations and modifications	
C Investigate soil characteristics and effects on plant health	**C1** Soil characteristics **C2** Soil textures and structure of cells **C3** Soil water, PH and nutrients **C4** Soil care	

Key teaching areas in this unit include:

Sector skills	Knowledge	Transferable skills/behaviours
• Soil and plant testing • Experiment skills • Machinery and tool operation • Health and safety	• Reliability of data recorded • Plant structures and functions • Soil types, texture and structure	• Communication • Working with others • Thinking skills/adaptability • Problem solving • Management of information • Self-management and development

Unit content

Knowledge and sector skills

- Working safely – operating machinery and tools with due regard for safety of self and others.

Learning aim A: Investigate plant structure, growth and development

A1 Plant structures

Features of the plant and their location within the plant structure to develop understanding of how plants grow and develop and how the growth patterns can then be manipulated. Internal and external parts of plants, where they can be found, and their functions.

- Cell structures, key features of plant cells and identification of organelles:
  - cell wall, cell membrane, nucleus, vacuole, cytoplasm, mitochondria, chloroplasts
  - reproduction of cells, cell division, process of mitosis and meiosis and where these take place.
- Internal parts of plants, location, functions and characteristics:
  - xylem
  - phloem
  - cambium
  - experiments to determine the role of the vascular bundle.
- External parts of plants, characteristics, function and component parts:
  - roots e.g. root cap, root hairs, primary root, lateral roots, intake of water and minerals, anchorage
  - shoots: tropisms, e.g. geotropism, phototropism
  - stems: structure, growth, strength, nodes, leaf buds
  - leaves: simple, compound, needles, scales, lamina, stoma, guard cells, veins, petiole
  - flowers: types, including: angiosperms, gymnosperms; pollination methods, e.g. wind pollinated, insect pollinated, water pollinated; inflorescence types, e.g. petals, tepals, sepals, male organs: microstrobili, stamen, anther and filament, female organs: ovary, stigma, style, macrostrobili.

A2 Plant processes

Plant processes, the factors that affect and influence their rates, and how each of these affect plant growth and development.

- Photosynthesis:
  - equation for process, (CO_2 to produce glucose and oxygen)
  - how plant canopies optimise the interception of sunlight
  - required factors e.g. water, carbon dioxide and light
  - limiting factors, e.g. light intensity, carbon dioxide concentration and temperature.
- Respiration:
  - equation for process
  - optimum conditions for respiration to take place
  - limiting factors, e.g. waterlogged soils, temperature, carbon dioxide concentration.
- Transportation, role of the vascular bundles that include:
  - xylem – moves water and minerals from roots upwards
  - phloem – moves glucose throughout the plant
  - transpiration – role of stomata in exhaling water evaporation.

- Diffusion:
  - definition of movement of molecules in and out of cells.
- Osmosis:
  - definition of movement of water through semi-permeable membranes.

Learning aim B: Investigate plant life cycles and adaptations to the environment

B1 Plant growth and development

Discovering how plants, trees and crops grow and reproduce, with reference to their life cycles and key terminology.

- Plant and crop types and life cycles, e.g. ephemeral, annual, biennial, herbaceous perennial, perennial; evergreens and deciduous plants.
- Planting times linked to plant types.
- Plant and crop features relevant to the industry and location, e.g. conifers and forestry:
  - monocotyledon characteristics: roots, foliage, stem and flower
  - dicotyledon characteristics: roots, foliage, stem and flower
  - gymnosperm , roots, foliage, stem and flower.
- Flower and crop structures, roles and processes:
  - parts of the seed: e.g. cones, microstrobilie, microsporophylls, megasporophyll*, m*egasporangium*,* testa, cotyledons, epicotyl, plumule, hypocotyl, radicle.
- Germination testing e.g. percentage germination, seed viability, seed health
  - types of pollination and characteristics: self-pollination, cross-pollination, wind pollination, insect pollination
  - process of fertilisation, seed and fruit production
  - seed dispersal: animals, insects, wind, rain, environmental changes and temperature, reasons for dispersal, dormancy
  - types of germination: epigeal, hypogeal.
- Woody perennials e.g. trees, shrubs and hedgerows features and structures, roles and processes:
  - structure to include: inner/outer bark, cambium, sapwood, heartwood
  - growth processes in branch, trunk, roots, including function of apical meristem, vascular meristem/cambium, xylem/phloem
  - extent and process of root growth
  - tree ring analysis to determine structure and variation in growth rates due to differentiation in species, damage, obstruction and seasonal/climatic differences.
- Asexual and vegetative reproduction:
  - meristems, cell division, formation of roots
  - underground storage organs, e.g. rhizomes, bulbs, corms, tubers, tap roots.

B2 Plant adaptations and modifications

How plants, trees and crops adapt to their environment and modify component parts for survival and growth, to ensure healthy plant growth.

- Optimum conditions for healthy plants, taking into account:
  - Topography: aspect
  - exposure to elements e.g. sun, wind, and rain
  - spacing requirements for plants, trees and crops
  - threats to growth from pests and diseases.
- Role of plant parts in adapting to changes in environment e.g. roots, stem, leaves.

- Environmental conditions affecting adaptations and modifications:
  - arid
  - wetland
  - tropical
  - woodland
  - effects of temperature.
- Plant modifications in different environmental conditions: e.g. roots for climbing or storage, leaves, shoots and stems: succulents, spines, tendrils, thorns for protection and scrambling.

Learning aim C: Investigate soil characteristics and effects on plant health

C1 Soil formation, weathering and erosion

Process of soil formation, soil components and soil erosion.

- Soil formation and weathering:
  - parent rock and minerals – igneous, sedimentary, metamorphic, silica, silicates
  - organic matter, decaying plant material, humus, animal matter, animal life, micro-organisms, water, air.
- Soil pit.
- Components of soil e.g.; air, aggregates; organic matter; water.
- Processes of soil weathering e.g.; physical, chemical and biological processes.
- Soil erosion and movement:
  - water, wind, steep slopes, tillage
  - terracettes, rills and gullies, tilting of fence posts, exposed roots, wind-borne particles.

C2 Texture and structure of soils

Recognising soil type by identifying characteristics of texture and structure and how human and environmental activities can impact on growth and development.

- Soil types e.g. sand, silt, clay, aggregate size.
- Soil texture:
  - proportions of sand, silt, and clay.
- Soil characteristics affected by texture:
  - drainage, particle size, colour, nutrients, how it feels, fertility.
- Soil structure: blocky, angular, platy
  - soil profiles, horizons and organic matter.
- Human and environmental influences on soil structure that affect plant growth and development:
  - identify compaction by machinery, use of penetrometer
  - crop rotation and cultivation techniques, effects of cultivation
  - poor drainage
  - weather conditions
  - low nutrient content
  - surrounding mature trees.

C3 Soil water, pH and nutrients

The importance of water in soil, water-holding capacity and its availability to plants and crops, including interpretation of visual evidence and experiments.

- Water availability in soils: percolation, infiltration, water content:
  - saturation point – gravitational water
  - field capacity – capillary water
  - permanent wilting point – hygroscopic water
  - removal of soil water: drainage, ditch and pond clearance
  - visual signs of water accumulation in field.
- Soil pH:
  - importance of soil pH on plant health and root growth
  - the soil pH scale and how to test soil pH, e.g. test kits, soil probe, laboratory analysis
  - reliability and validity of pH testing
  - effects of varying pH levels e.g. stunted growth, distorted foliage and discoloured foliage
  - how to manage and control levels of pH.
- Soil nutrients:
  - the roles of major plant nutrients: nitrogen (N), phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sulphur (S)
  - micro plant nutrients: boron (B), chlorine (Cl), copper (Cu), iron (Fe), manganese (Mn), molybdenum (Mo), zinc (Zn)
  - interpreting nutritional information e.g.; fertiliser bags, soil analysis results
  - recognising and managing nutrient deficiencies of major and secondary plant nutrients.

C4 Soil care

The importance of soil care and management to improve soil texture, structure and plant health.

- Management of soil erosion:
  - monitor growth and development of plants in the field.
- Benefits of crop rotation e.g. improving soil erosion, use of cover crops, companion plants, mulching.
- Methods of reducing compaction
  - establishing shelter belts, planting hedgerows.
- Improvement of soil texture and structure:
  - mulching
  - incorporation of organic material e.g. straw
  - breaking-up of a compaction
  - cultivation methods.
- Management of soil nutrients with fertiliser:
  - how and why fertilisers are used in soil care.
- Interpreting nutritional information e.g.; fertiliser bags, soil analysis results.
- Types of fertiliser e.g. straights, compounds liquid, suspensions, prills, granules, slow release, and availability to plants:
  - organic fertilisers e.g. compost and leaf mulch, green manure and farmyard manures
  - inorganic (synthetic) fertilisers e.g. nitrogen, phosphorus, potassium, iron, sulphate of ammonia, sulphate of potash, iron sulphate NH_4NO_3, Muriate of Potash, Triple Super Phosphate.

- Soil mapping to determine fertiliser application rates.
- Common soil problems and how these are managed:
  - poor drainage and waterlogging
  - drought
  - nutrient deficiency.

Transferable skills

Preparing for work

- Research skills – locating relevant information and presenting in a suitable manner
- Working in a team – sharing responsibilities, gathering and sharing information.

Developing practical and technical skills

- Managing information – gathering detail for a purpose and recording accordingly, health and safety regulations.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Investigate plant structure, growth and development		
A.P1 Identify the cell structures of specified plants.	**A.M1** Explain how plant cell structures, and internal and external characteristics of plants influence processing for nutrition and respiration.	**A.D1** Analyse how plant cell structures, internal and external characteristics influence how plants meet their nutrition and respiratory requirements.
A.P2 Outline the internal and external characteristics and components of specified plants.		
A.P3 Outline the processes plants use, to meet nutritional and respiratory requirements.		
Learning aim B: Investigate plant life cycles and adaptations to the environment		
B.P4 Explore the growth and development of specified plants.	**B.M2** Explain the growth and development of specified healthy plants and how plants adapt to their environments.	**B.D2** Assess how growth and development of healthy plants are dependent on environmental factors.
B.P5 Outline how specified plants adapt to environmental conditions.		
Learning aim C: Investigate soil characteristics and effects on plant health		
C.P6 Carry out tests to determine given soil characteristics, water availability, PH and nutrients.	**C.M3** Explain the effects that soil characteristics have on specified plants' health and this can be improved.	**C.D3** Evaluate the relationship between soil characteristics and care and health of a specified plant.
C.P7 Outline how to improve soil texture and structure for a specified plants' health.		

Essential information for assessment decisions

Learning aim A

For distinction standard, learners will:

- provide thorough, clearly labelled, annotated and accurate diagrams of cell structures and internal and external parts of plants, including flowers. They discuss all the plant processes for nutrition and respiration comprehensively, explaining in detail how and where these takes place. Learners discuss at least two limiting factors of the processes and make suggestions on how to overcome these. They provide accurate details on how plants transport nutrients and water. Learners consistently use correct biological names. They show clear links between the processes and the cell structures and internal and external parts of plants.

For merit standard, learners will:

- provide annotated labelled diagrams of cell structures and, internal and external parts of plants, including flowers. They explain most of the plant processes and how and where these take place. Learners give detail on at least two limiting factors of the processes. They explain how plants transport nutrition and water. Learners use correct biological names most of the time. They show some links between the processes and the cell structures and internal and external parts of plants.

For pass standard, learners will:

- present outline labelled diagrams of cell structures and, internal and external parts of plants, including flowers. They summarise the plant processes and how and where these takes place but may only cover two processes. Learners provide at least one limiting factor of the processes. They summarise how plants transport nutrition and water. They use limited biological names but may not always be relevant to the structure or part of the plant. Learners may make some links between the processes and the cell structures and internal and external parts of plants but these may not always be clear.

Learning aim B

For distinction standard, learners will:

- provide accurate comprehensive detail on the plant type and how its life style affects planting times. They explain germination by providing either an accurate fully annotated illustration or accurate details on the development and growth processes for specified plants/trees/crops. Learners clearly distinguish between the development and growth processes showing full understanding of the differences between the two, by providing valid and accurate examples. They explain in detail all the optimum conditions for the development of healthy specified plants/crops/trees. They provide clear examples of environmental conditions affecting the plant/crop/tree growth, clearly explaining why it is important to choose the correct conditions for the particular plant/crop/tree. They provide relevant examples of how plants adapt to environments by modifying themselves e.g. thorns, scrambling.

For merit standard, learners will:

- provide mostly accurate details on the plant type and how its life style affects planting times. They describe germination by providing either an annotated illustration or details on the development and growth processes for specified plants/trees/crops most of the time. Learners distinguish between the development and growth processes, showing some understanding of the differences between the two by using examples. They describe at least two the optimum conditions for the development of healthy specified plants/crops/trees. They provide some examples of environmental conditions affecting the plant/crop/tree growth. They give at least two reasons why it is important to choose the correct conditions for the particular plant/crop/tree. They provide at least two examples of how plants adapt to environments by modifying themselves e.g. thorns, scrambling.

For pass standard, learners will:

- explore a species of plant/crop/tree and outline the plant type and when the most condusive planting times are. They outline the germination process by providing either a basic annotated illustration or a summary on the development and growth processes for specified plants/trees/crops. Learners show some understanding of the differences between the development and growth processes. They outline a minimum of two optimum conditions for the development healthy specified plants/crops/trees. They provide at least one example of an environmental condition affecting the plant/crop/tree growth. They provide at least one example of how plants adapt to environments by modifying themselves e.g. thorns, scrambling.

Learning aim C

For distinction standard, learners will:

- accurately determine all the characteristics of the soil. They will describe the texture and structure, water availability/absorbency, PH and nutrients, by providing accurate examples of each. Learners will make valid recommendations for soil improvement to accommodate the given plant/crops/trees health, providing valid and well thought out ideas. This could be in the context of maintaining soil fertility optimising the yield of a crop or reducing the fertility of any area to establish a community of flowers to enhance biodiversity.

For merit standard, learners will:

- determine most of the characteristics of soil from the tests they conduct. They will describe the texture and structure, water availability/absorbency, PH and nutrients, by providing examples for most of them. Learners will show that they understand how the soil accommodates the given plant/crops/trees health by providing some examples. They make some recommendations on how the soil can be improved.

For pass standard, learners will:

- carry out simple tests to determine soil texture, structure, including checking for compaction, and pH for a given site. They will provide a list of the findings for at least three characteristics e.g. soil type, components, texture and structure, drainage, water availability, PH and nutrient value. The will be able to state why they are carrying out or recommending the actions undertaken.
- provide at least two ways that soil texture, structure and plant health could be improved.

Assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity. *Section 6* gives information on setting assignments and there is further information on our website.

A suggested structure for summative assessment is shown in the *Unit summary* section, along with suitable forms of evidence. This is for illustrative purposes only and can therefore be adapted to meet local needs or to assess across units where suitable opportunities exist. The information in the *Links to other units* section will be helpful in identifying opportunities for assessment across units.

The following scenario could be used to produce the required evidence for this unit. Centres are free to use comparable scenarios or other forms of evidence provided that they meet the assessment requirements of the unit.

Suggested scenario

You are working on a farm which also has a small horticultural nursery as well as an established woodland. The farm would like to develop the range of crops they are growing as well as introduce some new species to the woodland. You need to gather a portfolio of evidence on plant growth and development and carry out practical assessments to understand the soil type. Your work will include developing an understanding the structure of plants and how each part functions to ensure good plant growth. You will need to collect the soil and complete a series of soil tests to determine the soils characteristics. You would then make recommendations on how to improve the soil for better plant health.

If a retake is necessary, an alternative example must be used. The following is an example of a retake assessment activity.

Use of different species and soil within the portfolio.

Further information for tutors and assessors

Delivery guidance

The following are examples of practical activities and workshops that tutors could use when developing sector and transferable skills in the delivery of this unit. Wherever possible, practical activities should be used to help learners develop both personal and sector skills in preparation for the final assessment. These suggestions are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit Covered by lectures, tutor led discussions and presentations to explain what the unit content contains, how it will be delivered and assessed. Assessment of prior knowledge to ascertain a start point for all learners. An induction to laboratory procedures may be necessary as will covering the health and safety aspect of this unit including handling of soils. **Suggested time:** about 4 hours.
Activity: Plant practical sessions Tutor led visits/practical activities to identify a range of plants and crops. This can take place in the field, nursery or woodland depending on the resources available. Group discussions on the types of plants seen and their growth patterns. Learners will carry out germination testing to support theory; learners can research nutritional disorders of plants as well as see examples that occur in plants and crops growing in the fields. Learners will use knowledge gained from other units to develop awareness of when and where crops and plants should be grown. **Suggested time:** about 15 hours.
Activity: Plant experiments Tutor led experiments to develop knowledge on cell structure, plant processes e.g. photosynthesis, respiration and transpiration. Learners can create a slide of a plant cell and look at this under the microscope and draw the findings. Recording and reflecting on evidence to contribute to assessment. **Suggested time:** about 10 hours.
Activity: Soil practical sessions Learners will access an area which can be cultivated offering the chance to see the benefits of cultivation on different soil types. Carry out cultivation operations to improve soils using a range of hand-held tools or machinery to identify the changes made to the soil structure. Observe visual signs of compaction through use of a penetrometer and record findings. Tutor led visit to observe drainage being carried out to prevent water stress. **Suggested time:** about 15 hours.
Activity: Soil experiments Tutor led laboratory / in field practical sessions to conduct soil tests working in small groups to carry out pH of soil. They can carry out a visual appraisal of soil type, texture and structure through a tutor led practical. **Suggested time:** about 8 hours.

Essential resources

For this unit, learners will need access to

- A range of plants, woody perennials and crops.
- Simple laboratory equipment suitable to test soil, and plants.

Links to other units

This unit draws on the knowledge and skills taught in:

- Unit 4: Machinery Operations in Agriculture
- Unit 7: Crop Production.

This unit has strong links to:

- Unit 1: Introduction to working in land-based industries
- Unit 3: Agriculture Work Placement.

Employer involvement

This unit would benefit from employer involvement in the form of:

- guest speakers
- practical sessions
- visits to local science laboratories to observe soil/ plant testing
- design/ideas to contribute to unit assignment/case study/project materials
- work experience
- own business materials as exemplars
- support from local business staff as mentors.

Unit 3: Tree Work Placement

Level: **2**

Unit type: **Mandatory**

Assessment type: **Internal**

Guided learning hours: **60**

Unit in brief

Learners develop skills and behaviours required for successful working in tree and timber industries.

Unit introduction

Do you think you could work well in a tree and timber industry? In this unit, you will learn new skills and experience hands-on tree work skills. Work placement gives a unique insight into working life and can help you to work out what you might want to do in arboriculture and/or forestry. You will also gain new skills in communication and teamwork, which you can add to your CV.

In this unit, you will develop and apply the important skills needed to perform confidently, and to a high standard, in a working environment. You will look for and take part in a work placement, ideally in a tree-related industry that appeals to you. Talking to, listening to and watching those in industry is the best way of learning about the work involved and what is required of an employee.

This unit will give you the fundamental work skills needed to apply for, and gain employment as an arboricultural or forestry worker. The unit includes 75 hours of real-life work experience.

Learning aims

In this unit you will:

A Investigate and apply for a tree-related work placement

B Demonstrate work skills relevant to a tree work placement

C Review own tree work placement.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Investigate and apply for a tree-related work placement	**A1** Investigating a work placement **A2** Applying for a work placement	A portfolio of work-related research and completed application documents evidenced by observation records or video evidence.
B Demonstrate work skills relevant to a tree work placement	**B1** Professional behaviours **B2** Communication skills **B3** Safe working	A work placement report supported by: • observation records/witness statements • video and/or photographic evidence of all practical activities • reported evidence of appropriate work skills and hours.
C Review own tree work placement	**C1** Review work placement **C2** Self-development and areas for improvement	Written evidence of review, reflection and self-development/areas for improvement.

Key teaching areas in this unit include:

Sector skills	Knowledge	Transferable skills/behaviours
• Job searching • Work research/ application processes • Workplace behaviour/techniques • Work skills	• Effective teamwork • Effective communication • Self-development	• Communication • Problem solving • Self-management and development • Thinking skills/adaptability • Working with others

Unit content

Knowledge and sector skills

Learning aim A: Investigate and apply for a tree-related work placement

A1 Investigating a work placement

- Work search resources, e.g. industry magazines, newspapers, internet job sites, social media, local advertisements.
- Documents:
  - job advertisement
  - job/role description
  - essential and desirable personal requirements
  - using these documents in an appropriate way.
- Identifying skills required to work in the sector, e.g. interpersonal skills, communication, technical knowledge, practical skills.

A2 Applying for a work placement

- Different methods of applying, e.g. application forms, CVs, covering letters, online applications, telephone enquiries, applying in person.
- How and where to find work application information, e.g. from human resources (HR) departments, company/organisation websites, job websites, local and national information sources, media, employment agencies.
- Job research: paying attention to all details of the job application so that nothing relevant is left out, ordering different types of information in a logical manner in the application document, checking whether or not to include supporting documents, e.g. work permits, certificates, personal identification, using personal statements to create positive impression of skills and interests.

Learning aim B: Demonstrate work skills relevant to a tree work placement

B1 Professional behaviours

- Working environment skills: appropriate attendance, appropriate personal presentation, positive attitude (appropriate demeanour, use of own initiative).
- Time management, including arriving at work on time, completing tasks in allocated time, e.g. pruning trees, checking tree growth or reporting to supervisors.
- Administrative skills, e.g. maintaining records, using email/phone, using workplace documents, using electronic equipment.
- Problem solving, e.g. finding alternative solution to problems, using technology to work more efficiently.
- Working with others, e.g. team briefing, completing maintenance and practical tasks, handling, communicating and implementing changes.
- Appreciation of others' needs and points of view, respecting equality laws/social diversity in the workplace.

B2 Communication skills

- Interpersonal skills, including appropriate speaking and listening skills.
- Use of appropriate and professional language.
- Use of initiative/asks for advice if unsure.
- Ability to receive and follow instructions.
- Interacting with visitors and staff appropriately.
- Communicating tasks completed.

B3 Safe working

- Safe working following protocols, following other work placement policies and procedures.
- Working with legal/good practice frameworks, e.g. Health and Safety at Work etc. Act 1974, Control of Substances Hazardous to Health (COSHH) Regulations 2002 etc.
- Use of personal protective equipment (PPE).
- Safe handling procedures.
- Safe working with tools and equipment.
- Risk assessment.

Learning aim C: Review own tree work placement

C1 Review work placement

- SWOT (strengths, weaknesses, opportunities and threats) relating to work placement.
- Identifying what went well and what did not go so well, including time taken to complete tasks, interaction with supervisors/managers, how well tasks were completed, factors taken into account when working outdoors.
- Using feedback from employers when evaluating performance.

C2 Self-development and areas for improvement

- Self-development:
  - identifying own training and development needs, e.g. skills audit
  - meeting/discussion with supervisor
  - review and reflection.
- Areas for improvement: based on own reflection, assessment (and feedback from others, if appropriate), e.g. get feedback and suggestions from all team members before deciding on solution to problem in the team task.

Transferable skills/behaviours

Communication

- Verbal, written and face-to-face communication with colleagues and tutors.
- Applying for placements in appropriate formats.
- Reviewing own performance.
- Reading feedback from employers.

Problem solving

- Solving customers' problems.
- Carrying out practical tasks.
- Identifying and choosing the right equipment.

Self-management and development

- Reviewing own performance after a placement.
- Identifying areas for improvement.
- Creating personal action plans for development.

Thinking skills/adaptability

- How to tackle job advertisements.
- Using information and relating own skills.
- Identifying own skills and areas for improvement.

Working with others

- Working with individuals or teams while on work placement.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Investigate and apply for a tree-related work placement		
A.P1 Demonstrate appropriate investigation for a work placement.	**A.M1** Demonstrate effective use of search and application documents for a work placement.	**A.D1** Justify work placement search and application activities carried out recommending improvements.
A.P2 Use appropriate application skills for a work placement.		
Learning aim B: Demonstrate work skills relevant to a tree work placement		
B.P3 Demonstrate adequate use of communication skills and practices during the work placement.	**B.M2** Demonstrate appropriate use of work skills and practices, working effectively with others during the work placement.	**B.D2** Demonstrate confident use of work skills and practices working confidently with others to achieve effective outcomes during the work placement.
B.P4 Demonstrate adequate behaviours during the work placement.		
Learning aim C: Review own tree work placement		
C.P5 Describe own tasks and activities carried out during own work placement.	**C.M3** Describe own performance during tasks and activities carried out, using relevant examples to demonstrate strengths and areas for improvement.	**C.D3** Explain own performance, using examples to identify strengths, areas for improvement and appropriate training and self-development needs in response to feedback from others.
C.P6 Identify own strengths and areas for improvement during a work placement.		

Essential information for assessment decisions

In order to provide evidence for assessment and to achieve this unit learners are required to complete 75 hours of work placement. The work placement must be with an employer, i.e. in an external setting. Work placement must be in working environments and could be with more than one provider if necessary.

Learning aim A

For distinction standard, learners will:

- show understanding of their own limitations during a work application process and of how their work application skills could be improved moving forward
- provide evidence of their suitability for the work placement in question.

For merit standard, learners will:

- use skills to provide an appropriate and developed CV and letter of application for a suitable work placement.

For pass standard, learners will:

- use work searching skills to locate two appropriate work advertisements and job descriptions
- use work searching skills to find one potential tree work placement
- use skills to apply for a relevant work placement
- provide a CV and completed application form for a work placement
- demonstrate acceptable use of spelling, grammar and word sense.

(Note: application for, as opposed to securing, a work placement is the focus of assessment for pass.)

Assessment activity

A suggested structure for summative assessment is shown in the *Unit summary* section, along with suitable forms of evidence. This is for illustrative purposes only and can therefore be adapted to meet local needs or to assess across units where suitable opportunities exist. The information in the *Links to other units* section will be helpful in identifying opportunities for assessment across units.

Learners should look for a work placement in a working environment appropriate to forestry/arboriculture and investigate the steps involved in applying for a placement and how these could be improved. Once on a work placement, each learner will show that they have the appropriate skills and behaviours that an employer would expect. When the placement is completed, learners will review their experience and consider appropriate training and development they could take advantage of. Learners need to take account of feedback received from others, for example workplace supervisors and tutors. In planning the timing of assessment, you need to consider opportunities for retaking for learning aim B.

Learning aims B and C

It is a requirement that all learners complete 75 hours of valid work placement in an external setting. This must be in addition to the 60 guided learning hours required for delivery of this unit. Work placement need not be limited to one provider, however, work placement in tree working environments run by, and/or on the site of, the centre are not appropriate. Suggested evidence records for the work placement can found on the Pearson website.

For distinction standard, learners will:

- give evidence of consistently appropriate personal presentation and positive attitude during work placement
- give evidence of excellent time management and problem-solving skills
- need little, if any, intervention by supervisor(s)
- work effectively with others in the work placement and have a full appreciation of others and other points of view
- consistently demonstrate effective safe working
- show a clear awareness of strengths and areas for improvement and development with reference to examples of working practice and behaviour
- show a clear understanding of how feedback from others can shape self-development needs constructively.

For merit standard, learners will:

- give evidence of appropriate personal presentation and positive attitude during work placement
- give evidence of appropriate time management and problem-solving skills
- need some intervention by supervisor(s)
- work appropriately with others in the work placement and have some appreciation of others and other points of view
- demonstrate effective safe working
- show an awareness of strengths and areas for improvement, with reference to examples of working practice and behaviour
- provide reflective information on how they could benefit from training and development, justified in relation to their own career aspirations, using feedback from others.

For pass standard, learners will:

- evidence adequate use of professional behaviours, communication skills and safe working skills as listed in the unit content
- need a lot of intervention needed from their supervisor(s)
- give information on the tasks and work activities they carried out, their strengths, areas for improvement and how they worked in respect of legal rights and responsibilities, as detailed in unit content
- include evidence of interpersonal and communication skills, time management and teamwork.

Further information for tutors and assessors

Delivery guidance

The following are examples of practical activities and workshops that tutors could use when developing sector and transferable skills in the delivery of this unit. Wherever possible, practical activities should be used to help learners develop both personal and sector skills in preparation for the final assessment. These suggestions are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit Poster making; work skills and behaviours for employment in forestry/arboriculture. **Suggested time:** about 4 hours.
Activity: Small group work/teamwork on scenario-based projects, searching for, and applying for jobs of interest in the forestry and arboriculture sector. **Suggested time:** about 8 hours.
Activity: Holding group meetings to develop communication and team working skills, scenario-based such as recruitment within businesses. **Suggested time:** about 4 hours.
Activity: Role play developing other working skills and behaviours in varying scenarios. **Suggested time:** about 3 hours.
Activity: Work placement review of own performance. **Suggested time:** about 4 hours.

Essential resources

For this unit, learners must have access to:

- a suitable site(s) for work placement
- appropriate transport to suitable sites (centres may need to organise)
- first-aid facilities and appropriately trained staff (wherever practical activities are undertaken).

Links to other units

This unit has strong links to:

- Unit 1: Introduction to Working in Land-based Industries
- Unit 2: Introduction to Plant and Soil Science
- Unit 4: Tree Felling and Ground-based Operations
- Unit 5: Assisting Tree Climbing and Aerial Pruning Operations
- Unit 6: Ecology of Trees, Woods and Forests
- Unit 7: Practical Tree Work Skills.

Employer involvement

This unit requires employer involvement in the form of fit-for-purpose work placements.

This unit would benefit from employer involvement in the form of:

- guest speakers
- own business materials as exemplars, for example use of workplace literature and information sources.

Unit 4: Tree Felling and Ground-based Operations

Level: **2**

Unit type: **Mandatory**

Assessment type: **Internal**

Guided learning hours: **60**

Unit in brief

Learners will be able to carry out a range of tree-felling and ground-based operations.

Unit introduction

In this unit, you will learn how to prepare worksites and select and maintain the tools, equipment and machinery used to manage trees. You will develop skills in tree-felling techniques.

In industries that manage the establishment, growth and management of trees, there are many job roles that require tree-felling and other ground-based skills. In this environment, it is important to have a wide skill set that will enable you to complete a range of tree-felling and ground-based pruning safely and professionally.

Proficiency in these skills will prepare you for employment as a forest worker, an assistant to a tree surgeon or as an estate worker. Completion of this unit will also help you to progress to further qualifications in forestry and/or arboriculture.

Learning aims

In this unit you will:

A Carry out machine and equipment selection and maintenance for tree-felling and ground-based operations

B Prepare a site for tree-felling and ground-based operations

C Carry out tree-felling and ground-based operations.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Carry out machine and equipment selection and maintenance for tree-elling and ground-based operations	**A1** Tools and equipment for ground-based operations **A2** Tools and equipment for tree-felling operations **A3** Maintenance of tools and equipment	• Observation records/witness statements. • Evaluation reports. • Logbooks. • Photo logs. • Blogs and social media posts.
B Prepare a site for tree-felling and ground-based operations	**B1** Safe site planning and preparation for ground-based operations to minimise movement of arisings and soil **B2** Safe site planning and preparation for tree felling which minimises movement of arisings and soil	
C Carry out tree-felling and ground-based operations	**C1** Ground-based operations **C2** Tree felling **C3** Disposal of waste and extraction of wood products	

Key teaching areas in this unit include:

Sector skills	Knowledge	Transferable skills/behaviours
• Planning • Site preparation • Safe working • Professional behaviours • Felling skills • Timber presentation • Clearance skills • Preparation skills	• Types of tree • Different sites • Different equipment • Health and safety • Arisings management	• Communication skills • Self-management and development • Working with others

Unit content

Knowledge and sector skills

Learning aim A: Carry out machine and equipment selection and maintenance for tree-felling and ground-based operations

A1 Tools and equipment for ground-based operations

- Types of ground-based operations, such as:
  - cross-cutting, e.g. of fallen/felled trees
  - chipping of branches
  - stump grinding of fallen or felled trees
  - pruning, pollarding or coppicing of trees
  - hedge trimming/clearing undergrowth or verges
  - branch removal, e.g. for safety reasons
  - breaking down trees, including 'snedding' of poles
  - 'in work' maintenance of tools and equipment used for ground-based operations, e.g. chainsaws, brushcutters.
- Types of tools and equipment used for ground-based operations, including:
  - tractor or other all-terrain vehicles (ATV)
  - chipper
  - leaf blower
  - trailers
  - hedge trimmer
  - shears
  - brush hooks, billhooks
  - powered strimmers, brushcutters
  - chainsaws for cross-cutting
  - ladders
  - wheelbarrow
  - stump grinder
  - pruning equipment, including long pole powered pruner
  - fuel and appropriate lubricants.
- Factors that affect choice, e.g. working space, availability of portable power, level of operator skill.

A2 Tools and equipment for tree-felling operations

- Types of tools and equipment used for tree felling, including:
  - petrol chainsaw
  - electric chainsaw
  - hand saw
  - winch
  - axe
  - breaking bar/felling lever
  - ropes and slings relevant to ground-based use
  - felling wedges
  - fuel and chain oil
  - maintenance kit (sharpening files, combi spanner)
  - timber tape
  - timber tongs/yard hook.
- Factors that affect choice, e.g. size of tree, availability of portable power, level of operator skill.

A3 Maintenance of tools and equipment

- Need to maintain tools and equipment to maintain efficiency and safety.
- Maintenance of tree-felling signage.
- Consequences of poor maintenance, e.g. equipment breakdowns, inefficient working.
- Using manufacturers' guidelines to ensure correct maintenance procedures.
- Pre-operation and in-use checks and maintenance, such as:
  - cleaning equipment
  - tractor/ATV checks, e.g. oil level/filters, tyre pressure, lubrication, electrics, PTO shaft, power winches
  - sharpening, e.g. pruning equipment, chainsaws
  - loading strimmer line
  - checking electrical supply if needed, e.g. portable generator
  - checking spare fuel, e.g. petrol, diesel, two-stroke oil/petrol mix
  - lubrication, including chain oil
  - checking ropes, cables and slings for damage.
- Preparation for 'in work' maintenance, e.g. chainsaw sharpening files, oils, fuels, chainsaw spanners and other operator tools.

Learning aim B: Prepare a site for tree-felling and ground-based operations

B1 Safe site planning and preparation for ground-based operations to minimise movement of arisings and soil

- Health and safety:
  - risk assessments
  - emergency plan
  - emergency haemorrhage-control kit
  - relevant diseases and biohazards, and protection against these (Lyme disease, leptospirosis, toxicity of plants, e.g. bracken).
- Working in different weather conditions (sun/heat, rain/wet, storm/hail, snow/cold).
- Placement of warning signs, if required.
- Traffic control, if required.
- Access by the general public.
- Observation of other site workers.
- Checking correct operations are being carried out.
- Ensuring access to the work area.
- Personal protective equipment (PPE) requirements, including appropriate use or availability of:
  - steel-toe-capped boots
  - ear defenders
  - face masks
  - helmets/visors
  - gloves
  - chainsaw-specific protection, e.g. gloves, trousers, boots and combination helmet
  - personal first-aid kit, including large wound dressing.

B2 Safe site planning and preparation for tree felling which minimises movement of arisings and soil

- Health and safety:
  - risk assessments
  - emergency plan
  - contents of first-aid kit
  - Lyme disease and protection against it.
- Identification/selection of trees for felling.
- Visual examination of tree and surroundings for potential risks and limits of responsibility to deal with them, e.g. power lines, improper equipment, signs of decay, hanging branches, poor tree structure, nearby footpaths/roads/structures.
- Establishing safety/danger zones.
- Checking/clearing escape routes and cutting zones.
- Methods of dealing with risks and limits of responsibility in relation to them, e.g. isolating power, supervision of bystanders, control of animals, access for emergency services.
- Use of appropriate warning signs.
- Positioning of equipment, fuel and lubricant.
- Working to an industry standard:
  - assessing risks and working safely
  - safely and competently carrying out tasks efficiently and accurately
  - working to an agreed specification and timescale
  - minimising movement of arisings and soil
  - working appropriately with respect for people and the environment
  - implementing biosecurity control measures, cleaning and disinfection of clothing, PPE, tools, equipment and vehicles.

Learning aim C: Carry out tree-felling and ground-based operations

C1 Ground-based operations

- Types of ground-based operations, such as:
  - cross-cutting, e.g. of fallen/felled trees
  - chipping of branches
  - stump grinding of fallen or felled trees
  - pruning, pollarding or coppicing of trees from the ground
  - hedge trimming/clearing undergrowth or verges
  - branch/limb removal, e.g. for safety reasons
  - breaking down trees, including de-limbing and 'snedding' of poles
  - 'in work' maintenance of tools and equipment used for ground-based operations, e.g. chainsaws, brushcutters.
- Working to an industry standard:
  - assessing risks and working safely
  - safely and competently carrying out tasks efficiently and accurately
  - working to an agreed specification and timescale
  - minimising movement of arisings and soil
  - working appropriately with respect for people and the environment
  - implementing biosecurity control measures, cleaning and disinfection of clothing, PPE, tools, equipment and vehicles.

C2 Tree felling

- Tree-felling operations, such as:
  - reviewing safety equipment, e.g. chainsaw trousers, gloves, helmet, ear defenders, first-aid kit
  - passing tools and equipment between workers
  - notch cutting, use of appropriate cutting technique related to each situation, e.g. slope work; avoidance of obstacles
  - controlling the direction of fall
  - felling and pruning aids and their uses, e.g. levers, wedges, ropes, slings, pull lines, chains, straps, winches, jacks
  - making the felling cut, use of appropriate techniques related to each situation
  - recognising indicators of imminent fall of trees, e.g. fibres cracking, opening of kerf
  - using escape routes to safely move away from the cutting zone
  - recognition of specific hazards, e.g. 'barber's chair', hung trees
  - 'in work' maintenance of tools and equipment, e.g. sharpening chainsaws, checking winch shear pins.
- Working to an industry standard:
  - assessing risks and working safely
  - safely and competently carrying out tasks efficiently and accurately
  - working to an agreed specification and timescale
  - minimising movement of arisings and soil
  - working appropriately with respect for people and the environment
  - implementing biosecurity control measures, cleaning and disinfection of clothing, PPE, tools, equipment and vehicles.

C3 Disposal of waste and extraction of wood products

- Efficient extraction of wood products:
  - use of trailers, log arches and horses
  - use of brash mats
  - stacking wood products, e.g. poles, logs, whole wood
  - minimising environmental impacts, e.g. use of brash mats.
- Appropriate waste disposal:
  - chipping
  - burning
  - creation of wildlife refuges
  - brash hedging
  - minimising environmental impacts.

Transferable skills/behaviours

Communication skills

- Demonstrating communication skills relating to ground-based operations.

Self-management and development

- Meeting customers' needs; meeting, dealing and complying with health and safety regulations and risk assessments.

Working with others

- Carrying out routine maintenance tasks and waste disposal in collaboration with others.

Assessment criteria

<table>
<tr><th>Pass</th><th>Merit</th><th>Distinction</th></tr>
<tr><td colspan="3">Learning aim A: Carry out machine and equipment selection and maintenance for tree-felling and ground-based operations</td></tr>
<tr><td>A.P1 Select and maintain tools and equipment correctly for specified tree-felling operations.</td><td rowspan="2">A.M1 Select and maintain appropriate tools and equipment effectively for tree-felling and ground-based operations, giving valid explanations for choices made.</td><td rowspan="2">A.D1 Select and maintain appropriate tools and equipment for tree-felling and ground-based operations, justifying all choices made.</td></tr>
<tr><td>A.P2 Select and maintain tools and equipment correctly for specified ground-based operations.</td></tr>
<tr><td colspan="3">Learning aim B: Prepare a site for tree-felling and ground-based operations</td></tr>
<tr><td>B.P3 Carry out appropriate site preparation for a specified tree-felling operation with assistance.</td><td rowspan="2">B.M2 Carry out effective site preparation for tree-felling and ground-based operations with some assistance.</td><td rowspan="5">BC.D2 Confidently carry out tree-felling and ground-based operations and clearance, reviewing processes and outcomes and suggesting improvements to inform future practice with minimal assistance.</td></tr>
<tr><td>B.P4 Carry out appropriate site preparation for specified ground-based operations with assistance.</td></tr>
<tr><td colspan="2">Learning aim C: Carry out tree-felling and ground-based operations</td></tr>
<tr><td>C.P5 Safely carry out appropriate tree felling at a specified site, including extraction of wood products with assistance.</td><td rowspan="2">C.M3 Safely carry out effective tree-felling and ground-based operations, including appropriate waste disposal and extraction of wood products with some assistance.</td></tr>
<tr><td>C.P6 Safely carry out appropriate ground-based operations at a specified site, including waste disposal with assistance.</td></tr>
</table>

Essential information for assessment decisions

Learning aim A

For distinction standard, learners will:

- correctly select and maintain the tools and equipment required for specified tree-felling and ground-based operations, giving valid reasons for their choices and explaining the need for correct maintenance
- explain potential consequences of using poorly maintained tools and equipment.

For merit standard, learners will:

- correctly select and maintain tools and equipment for specific tree-felling and ground-based operations, giving valid reasons for the choices made.

For pass standard, learners will:

- correctly select and maintain tools and equipment before and during a specified tree-felling operation, and two ground-based operations, one of which will include the use of hand tools and the other the use of powered tools and equipment.

Learning aims B and C

For distinction standard, learners will:

- review own site preparation for specified tree-felling and ground-based operations, giving fully reasoned explanations for their decisions and the improvements they identify
- carry out tree-felling and other ground-based operations to industry standard in terms of risk assessment, safety, minimising environmental impacts, biosecurity and working to agreed specifications and timescales
- review own tree-felling and ground-based operations, giving fully reasoned explanations for their decisions and the improvements they identify.

For merit standard, learners will:

- review site preparation prior to tree-felling and ground-based operations, giving reasons for specific tasks carried out
- carry out tree felling of small trees and ground-based operations, with some assistance, to an agreed standard in terms of safe working practice, timescale and accuracy, including waste disposal and extraction of wood products.

For pass standard, learners will:

- prepare a site and carry out a minimum of two ground-based operations, one requiring the use of hand tools and the other requiring the use of powered tools and equipment, demonstrating safe working practice with assistance
- prepare a site and carry out felling of small trees of less than 380 mm diameter and not exceeding the chainsaw guide bar length, demonstrating safe working practice, disposing of waste correctly and extracting wood products, with assistance in the site preparation and felling of trees. This will be demonstrated to an agreed standard in terms of safe working practice, timescale and accuracy, including waste disposal and extraction of wood products
- demonstrate safe use of powered tools and equipment, including chainsaw, brushcutter or powered pole pruner or strimmer, and either chipper or stump grinder with assistance.

Assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity. *Section 6* gives information on setting assignments and there is further information on our website.

A suggested structure for summative assessment is shown in the *Unit summary* section, along with suitable forms of evidence. This is for illustrative purposes only and can therefore be adapted to meet local needs or to assess across units where suitable opportunities exist. The information in the *Links to other units* section will be helpful in identifying opportunities for assessment across units.

The following scenario could be used to produce the required evidence for this unit. Centres are free to use comparable scenarios or other forms of evidence provided that they meet the assessment requirements of the unit.

Suggested scenario

You are working as a grounds worker, responsible for trees on a large estate. Your main role is to maintain the estate grounds. You will be observed demonstrating your skills in selecting and maintaining equipment, carrying out grounds maintenance and processing waste. It is important that you meet the needs of the estate as it is open to the general public. When demonstrating your skills, you will be observed by either a tutor, who will take on the role of your supervisor/manager, or an employer from the industry.

If a retake is necessary, an alternative example must be used. The following is an example of a retake assessment activity.

Your centre is looking to recruit new staff to join its existing grounds-management team. You have been asked to apply for the role based on your skill set. You will be observed demonstrating your skill set to meet the requirements of the job role. Following your interview, you will be required to review your practice in accordance with industry standards. When demonstrating your skills, you will be observed by either a tutor, who will take on the role of your supervisor/manager, or an employer from the industry.

Further information for tutors and assessors

Delivery guidance

The following are examples of practical activities and workshops that tutors could use when developing sector and transferable skills in the delivery of this unit. Wherever possible, practical activities should be used to help learners develop both personal and sector skills in preparation for the final assessment. These suggestions are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit Tutor-led discussion on the types of tree-felling and ground-based tasks that could be carried out. Discussion of the relevant health and safety considerations as well as other workers and the general public. Learners to research a range of tasks that fall under the umbrella of tree-felling and ground-based operations. **Suggested time:** about 5 hours.
Activity: Preparation of sites Tutor-led demonstration of how to carry out a range of preparation tasks, for example clearing the site, putting up signage, inspecting trees and surroundings. **Suggested time:** about 5 hours.
Activity: Types of machines/equipment Learner-led research looking at a range of machines and equipment that can be used for tree-felling and ground-based operations, for example chainsaws, stump grinders, tractors, chippers. Learners should be made aware of the different manufacturers' guidelines on how to maintain each piece of equipment safely. Tutor-led demonstration of how to carry out a range of maintenance tasks. **Suggested time:** about 8 hours.
Activity: Maintenance of machines/equipment This aspect of the unit should be learner led and give them the opportunity to maintain a range of machines and equipment to manufacturers' guidelines. Supervision and support should be provided throughout. Discussions could take place that identify why learners are carrying out certain procedures. **Suggested time:** about 8 hours.
Activity: Discussion of operations Group-based discussion on how and why a range of tools and equipment can be used. Research can be carried out to support this. This should also relate to the tools and equipment available at the centre. **Suggested time:** about 4 hours.
Activity: Tutor-led demonstrations using tools and equipment to perform tree-felling and ground-based operations Learners are shown and practise how to use a range of tools and equipment to perform tree-felling and ground-based operations. Supervision will be close, particularly where chainsaws, brushcutters, chippers and stump grinders are being used by inexperienced learners. To ensure that safe working is carried out at all times, instructions to learners will include techniques and working practices. **Suggested time:** about 12 hours.

Activity: Carry out operations Learner-led aspect of the unit that focuses on carrying out a range of tree-felling and ground-based operations. Learners should use the knowledge they have gained to demonstrate their skills. Support and guidance should be provided where relevant. **Suggested time:** about 8 hours.
Activity: Evaluating performance Tutor-led discussions and demonstrations to review learner performance and outcomes of tree-felling and ground-based operations. **Suggested time:** about 4 hours.
Activity: Assessment Learners carry out practical assessments of tree-felling and ground-based operations. Since these are practical assessments, they will need to be included in the GLH. **Suggested time:** about 6 hours.

Essential resources

For this unit, learners will need access to:

- warning signs for site operations
- a range of sites, for example farmland, parkland, nature reserves
- PPE equipment
- a tractor and a range of suitable equipment, for example chipper, leaf blower, hedge trimmer, shovels, wheelbarrow, rakes.

Links to other units

This unit has strong links to:

- Unit 1: Introduction to Working in Land-based Industries
- Unit 2: Introduction to Plant and Soil Science
- Unit 5: Assisting Tree Climbing and Aerial Pruning Operations
- Unit 7: Practical Tree Work Skills.

Employer involvement

This unit would benefit from employer involvement in the form of:

- guest speakers
- work experience
- demonstrations
- observations
- support from local business staff as mentors.

Unit 5: Assisting Tree Climbing and Aerial Pruning Operations

Level: **2**

Unit type: **Mandatory**

Assessment type: **Internal**

Guided learning hours: **30**

Unit in brief

Learners will be able to set up for, and assist, other climbers in aerial pruning operations.

Unit introduction

Tree species often require remedial action involving work at height. Due to this, aerial operatives require support from the ground to ensure safe and effective task completion. Ground operatives must possess the ability to facilitate the safe assistance of both climbing operations and subsequent pruning. The skills required are specific to the tree care industry, and as risk levels are often elevated, each skill has high importance.

In this unit, you will learn how to prepare sites for work, communicate and assist others during tree climbing works, and deal with the tree arisings as a result of works. You will develop your ability to work as part of a team engaged in the safe maintenance of trees and the clearing of tree worksites. You will safely use tools and equipment to assist in tree climbing and pruning, to improve sites that contain trees, maintain the health of trees and move tree parts and other arisings in preparation for different uses.

The communication, teamwork and tree work skills developed in this unit are essential if you are looking for a career in the forestry and/or arboriculture industries.

Learning aims

In this unit, you will:

A Prepare and secure a site in readiness for aerial pruning operations

B Assist others with safe climbing and aerial pruning of trees

C Carry out safe processing of arisings.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Prepare and secure a site in readiness for aerial pruning operations	**A1** Health and safety **A2** Site preparation **A3** Tree climbing equipment and tool preparation	• Observation records/ witness statements. • Self-evaluation reports. • Logbooks. • Photo logs.
B Assist others with safe climbing and aerial pruning of trees	**B1** Implementation of safe systems during aerial operations **B2** Lowering systems **B3** Operating a lowering system	
C Carry out safe processing of arisings	**C1** Moving arisings produced from tree work **C2** Preparing arisings for further disposal **C3** Process arisings	

Key teaching areas in this unit include:

Sector skills	Knowledge	Transferable skills/behaviours
• Planning and preparing sites • Preparing tools and equipment • Assessing hazards and risks • Assisting tree workers • Operational checks and pre-and post-tree-pruning operations	• Health and safety • Safe practice • Following operational instructions • Understanding of tool and equipment uses	• Communication • Managing information • Preparing for work • Problem solving

Unit content

Knowledge and sector skills

Learning aim A: Prepare and secure a site in readiness for aerial pruning operations

A1 Health and safety

- Risk assessment:
  - a range of hazards and risks identified associated with both the site and the task
  - appropriate communication system established between colleagues
  - signage appropriate to situation (pathways, public access areas and roads, including single carriageway, bends in the road with limited visibility and T-junctions)
  - forward planning completed appropriate to site and situation (residential/commercial or rural/isolated, access/restrictions, accident and emergency facility location)
  - first-aid facilities on site appropriate to task and training, availability and readiness of this should include additional aerial rescue equipment
  - identification of roles and responsibilities prior to work activities.

A2 Site preparation

- Team discussion of task and agree method of execution.
- Efficient site organisation (tools securely and safely stored while still being available).
- Establishment of refuelling area in relation to works.
- Identification of possible targets/obstacles.
- Control measures to limit damage to identified targets/obstacles.
- Preparation of drop zones.
- Base of tree cleared to allow set up of lowering system (brashing, consideration for tree protection (bark), removal of subsequent arisings).

A3 Tree climbing equipment and tool preparation

- Selection of correct equipment to assist climber's ascent:
  - ladders
  - climbing kit (rope, harness and karabiners).
- Inspection of selected tools and equipment for use, such as:
  - top-handle chainsaw
  - lowering rope and equipment
  - pruning saw
  - rear-handle chainsaw.
- Preparation checks on equipment for use, such as:
  - additional attachment points (tool strop, karabiner)
  - fuel and oil
  - chainsaw chain for condition and tension
  - external nuts and bolts checked for security
  - safety features inspected for condition.

Learning aim B: Assist others with safe climbing and aerial pruning of trees

B1 Implementation of safe systems during aerial operations

- Establishment of effective communication with climber:
  - verbal system used with key phrases agreed
  - hand signal agreed when verbal communication may be limited or not possible.
- Management of climber rope system (drop zone, immediate descent of climber in event of accident.
- Pedestrian and vehicular traffic management (signage, barriers, cones, banksman role).
- Safe passing and retrieval of equipment to and from climber.

B2 Lowering systems

- Selection of equipment relevant to the branches/timber to be lowered.
- Inspection of equipment for use (pre-/post-operations).
- Knowledge of different lowering system set up.
- Knowledge of different anchoring methods.

B3 Operating a lowering system

- Set up a basic lowering system to lower light material.
- Set up a lowering system to lower heavier material.
- Communicate effectively with the climber.
- Lower produce on a system set up for light material.

Learning aim C: Carry out safe processing of arisings

C1 Moving arisings produced from tree work

- Organisation of waste disposal.
- Manual techniques (safe lifting techniques and lifting aids).
- Knowledge of mechanical assistance (winch).
- Knowledge of assistance by machinery.

C2 Preparing arisings for further disposal

- Efficient use of tools and machinery.
- Correct tool selection for task.
- Branches divided at suitable sections of unions.

C3 Process arisings

- Produce habitat piles with arisings.
- Conduct dead hedging with arisings.
- Methods of energy generation using arisings (heat/electricity).
- Uses of mulch.
- Appropriate site presentation after operations and reasons why this is important.

Transferable skills/behaviours

Communication

- Communicating with tree climbers.
- Working as a team.

Managing information

- Interpreting and using industry and manufacturer instructions and guidelines.
- Relating legislation and codes of practice to practice situations.

Preparing for work

- Planning practical events.
- Developing practical and technical skills.

Problem solving

- Working as a team.
- Preparing and maintaining tools and equipment.
- Identifying problems with tools and equipment and developing solutions.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Prepare and secure a site in readiness for aerial pruning operations		
A.P1 Prepare site adequately, including assessment of risks.	**A.M1** Prepare site, tools and equipment efficiently, meeting needs of given tree works.	**A.D1** Review work preparation carried out, using feedback from others, recommending improvements.
A.P2 Prepare tools and equipment adequately.		
Learning aim B: Assist others with safe climbing and aerial pruning of trees		
B.P3 Assist others adequately to safely ascend trees.	**B.M2** Assist others effectively in the climbing and pruning of trees, commenting on safety.	**B.D2** Assist others confidently in the climbing and pruning of trees, justifying safety measures employed.
B.P4 Assist others adequately to safely prune trees at height.		
Learning aim C: Carry out safe processing of arisings		
B.P5 Safely demonstrate adequate processing of arisings.	**B.M3** Safely demonstrate efficient processing of arisings, commenting on safe use of methods and techniques.	**B.D3** Safely demonstrate confident processing of arisings, justifying methods and techniques employed.

Essential information for assessment decisions

Learning aim A

For distinction standard, learners will:

- review effectiveness of identified control measures
- consider in depth all aspects of site management
- ensure that tree base is cleared with consideration for tree protection (bark)
- demonstrate a high level of care for tools and equipment, with minimal assistance, and knowledge of preparation.

For merit standard, learners will:

- communicate control measures for identified risks/hazards
- manage basic site hazards in consideration of task
- ensure that base of tree is cleared with consideration for task
- demonstrate care for tools and equipment with some assistance.

For pass standard, learners will:

- complete risk assessment with forward planning
- identify main risks/hazards to team
- manage basic site hazards, to include targets/obstacles
- demonstrate preparation of tools and equipment and base of tree with assistance.

Learning aim B

For distinction standard, learners will:

- demonstrate command of a situation
- demonstrate rope maintenance skills, knowledge of a situation/thinking ahead with minimal assistance
- demonstrate quick reactions to intercept incoming hazards early and communicate these accordingly
- demonstrate safe positioning during retrieval at all times, and ability to tie knots (sheet bend and marlin spike) to send tools and equipment of varying weights to and from climber
- select equipment suitable for tasks, commenting on condition and potential defects
- explain in detail three checks to be made on each lowering component, with reference to the Lifting Operations and Lifting Equipment Regulations 1998 requirements and Approved Codes of Practice (ACOPs)
- demonstrate the ability to manipulate loads into desired landing zone with minimal assistance.

For merit standard, learners will:

- explain in detail three checks to be made on each lowering component
- demonstrate knowledge of maintaining ropes during lowering operations.

For pass standard, learners will:

- communicate adequately with climber
- demonstrate maintenance of rope system with assistance
- demonstrate some awareness of incoming hazards and communicate these to climber
- appropriately use different easy-release knots
- safely retrieve equipment through suitable positioning
- select equipment suitable for task
- confirm equipment is in suitable condition for use
- demonstrate ability to set up and use simple lowering system with assistance.

Learning aim C

For distinction standard, learners will:

- evaluate uses of arboricultural arisings, considering biosecurity and associated pathogens
- evaluate the various methods of energy generation, considering suitability, sustainability and cost.

For merit standard, learners will:

- safely move waste from drop zone after effective communication with climber
- effectively further process arisings in preparation for end product use
- efficiently process arisings into end product with limited assistance
- expand on the reasons for leaving a tidy worksite after operations, taking into consideration company reputation and use of site after operations.

For pass standard, learners will:

- safely move waste from drop zone
- further process arisings in preparation for end product
- process arisings safely, with assistance, into end product
- explain the need to leave a tidy worksite after operations. The main consideration should focus on safety.

Assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity. *Section 6* gives information on setting assignments and there is further information on our website.

A suggested structure for summative assessment is shown in the *Unit summary* section, along with suitable forms of evidence. This is for illustrative purposes only and can therefore be adapted to meet local needs or to assess across units where suitable opportunities exist. The information in the *Links to other units* section will be helpful in identifying opportunities for assessment across units.

The following scenario could be used to produce the required evidence for this unit. Centres are free to use comparable scenarios or other forms of evidence provided that they meet the assessment requirements of the unit.

Suggested scenario

You work as a trainee groundsperson for a commercial amenity tree care company, primarily on residential contracts covering a range of different tree situations. Situations often present limited access, minimal drop zones or valuable targets/obstacles. Safety of all operatives is paramount throughout tasks.

Your task is to assist in the preparation and operation of a suitable lowering system for aerial timber removal (branches).

In particular, your aims will be to:

- provide a safe place of work through risk assessment, with control measures implemented
- set up the site in preparation for tasks, which should include preparation of trees to be worked with
- operate a recognised lowering system while maintaining control of others
- maintain the lowering system, ensuring the rope remains untangled
- remove arisings at a suitable point to allow the task to remain efficient.

If a retake is necessary, an alternative example must be used. The following is an example of a retake assessment activity.

Learners will carry out lowering operations in a different situation. Scenario aims will be identical though the tree situation will differ, for example garden pond, animal enclosure, glasshouse.

Further information for tutors and assessors

Delivery guidance

The following are examples of practical activities and workshops that tutors could use when developing sector and transferable skills in the delivery of this unit. Wherever possible, practical activities should be used to help learners develop both personal and sector skills in preparation for the final assessment. These suggestions are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit Tutor-led introduction to the importance of risk management within tree care. This would be further supported with smaller group discussions on hazard evaluation surrounding both potential worksites and tasks. Sites should be bases on actual situations, such as working in proximity to pathways, roads and areas with public access. Tutors should allow learners the opportunity to develop their own risk assessments, before highlighting the importance of forward planning. Communication methods should be discussed with learners to allow time to consider the advantages/disadvantages of each. Codes of practice for aerial tree work should be introduced, with a focus on the operative's roles and responsibilities during work activities. **Suggested time:** about 3 hours.
Activity: Equipment selection and preparation Tutor-guided sessions on the procedures and practices used to prepare equipment for safe use. Sessions should start with initial theory on Lifting Operations and Lifting Equipment Regulations 1998 and codes of practice for arboriculture. This should be followed by practical focused delivery inspecting the different types of access equipment and the maintenance for each. Learners could develop and use pre-use checklists and carry out activities to develop ICT skills by creating electronic recording systems in groups, which could then be peer assessed by other groups for functionality. **Suggested time:** about 6 hours.
Activity: Site preparation and implementation of safe systems After the initial introduction, tutors should allow for the actual set up of various sites for arboriculture operations. It is recommended that scenarios include pathways, roadways and public access areas. Role play could be utilised in individual groups with assigned roles (tree work team/general public) to allow interactions between peers so that working skills, communication and behaviour in varying scenarios is developed. **Suggested time:** about 8 hours.

Activity: Lowering systems

Tutor-led introduction to aerial rigging and lowering systems within tree work. Basics should be covered during the initial introduction, such as the role of friction in rigging/lowering. Learners should be given the opportunity to research and discuss rigging operations and the types of friction devices available for use. It would be beneficial for a number of friction devices to be available so that learners can inspect and become familiar with them. Learners should grasp the advantages and application of each available friction device.

Learning should be consolidated by giving learners the opportunity to install a basic system for lowering, such as a simple Port-a-Wrap. Although it is not essential that learners actually lower on the device, learners must understand the importance of running lines during produce lowering. A strong focus should be placed on safety and communication and learners must be introduced to the industry standard for hand signals.

Additional equipment (taglines) that can be employed during lowering operations should be considered so that learners gain a wider understanding of how loads can be manipulated during descent.

Suggested time: about 8 hours.

Activity: Carry out safe processing of arisings

Group work could be applied to open this section, allowing learners to identify and agree what is classed as actual arisings from tree work. A strong focus should be placed on biosecurity at all times during this element, especially when learners are given the opportunity to process arisings as a practical. Both destructive and non-destructive methods should be introduced by the tutor, although learners should be allowed to agree their preferred method of disposal if suitable reasons can be specified for their choice. Arisings should be made available for learners to execute their agreed method. Site clearance prior to exit should be discussed, and the associated safety aspects, for example public safety.

Suggested time: about 4 hours.

Essential resources

For this unit, learners will need access to equipment and resources for practical tasks, which should allow for various lowering configurations.

Links to other units

This unit has strong links to:

- Unit 1: Introduction to Working in Land-based Industries
- Unit 3: Tree Work Placement
- Unit 4: Tree Felling and Ground-based Operations
- Unit 7: Practical Tree Work Skills.

Employer involvement

This unit would benefit from employer involvement in the form of:

- provision of work-based scenarios to support delivery and assessment
- work experience in placements involved with amenity tree care
- guest speakers/practitioners, especially those involved with amenity arboriculture or associated with one of the industry bodies such as the Arboricultural Association, which is an authority on arboricultural best practice.

Unit 6: Ecology of Trees, Woods and Forests

Level: **2**

Unit type: **Mandatory**

Assessment type: **Internal**

Guided learning hours: **30**

Unit in brief

Learners will study the ecology of trees, woods and forests to understand their importance for biodiversity and meeting human needs.

Unit introduction

Over 30% of the Earth's land surface is covered with trees. Trees, woods and forests are a sustainable and often commercial primary resource that meets our needs for warmth, shelter, health and welfare and many important products we rely on. They are key for natural biodiversity but are often under threat, particularly in the UK where trees once covered all but the highest mountain ranges.

In this unit, you will develop the practical skills needed to investigate the ecology of trees, woods and forests, and you will come to appreciate the complex relationships that make them so important for biodiversity. You will also learn to recognise how trees meet basic human needs on a variety of scales from local to global, and realise how necessary it is to manage the woodland ecosystem.

This unit is essential if you want to work with trees, whether through forestry, arboriculture or habitat management. The practical skills you develop will benefit a career in ecology, forestry, arboriculture and many other outdoor occupations.

Learning aims

In this unit you will:

A Explore natural and human impacts on tree ecology and forest biodiversity

B Carry out practical woodland investigation.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Explore natural and human impacts on tree ecology and forest biodiversity	**A1** Woodland ecology **A2** Human impacts on trees, woods and forests	Report on human and natural influences on tree ecology and forest biodiversity at different scales, related to specific examples.
B Carry out practical woodland investigation	**B1** Practical woodland investigations **B2** Meeting human needs **B3** Recording woodland investigations	Evidence could include: • logbooks/blogs • witness/observation records • reports • field notebooks.

Key teaching areas in this unit include:

Sector skills	Knowledge	Transferable skills/behaviours
• Identification of tree and other plant/animal species • Classification of woodlands • Drawing up and/or working to habitat maintenance specifications	• UK woodland ecosystems and their characteristics • Global forest biomes • Human and natural impacts on biodiversity and sustainability	• Developing practical and technical skills • Managing information • Problem solving • Working with others

Unit content

Knowledge and sector skills

Learning aim A: Explore natural and human impacts on tree ecology and forest biodiversity

Learners will develop an understanding of woodlands to explore the relationships between plant and animal species, and natural and human impacts on woodlands.

A1 Woodland ecology

- Identification, distribution and characteristics of tropical, temperate and taiga forests:
  - climate, e.g. rainfall, temperature
  - location, e.g. using a map to show distribution
  - plant and animal species diversity, e.g. comparison of species
  - soil, e.g., podzol, brown earth.
- The natural succession of UK woodlands from the end of the last Ice Age to the start of large-scale forest clearance in the Neolithic period.
- Woodland relationships between plants/animals/trees:
  - symbiotic, e.g. seed dispersal by birds and mammals
  - predator/prey, e.g. owls/mice, adders/birds' eggs, foxes/rabbits
  - natural cycles, e.g. carbon, nitrogen, water.
- Measuring biodiversity, e.g. species counts, estimates of plant/animal populations.
- Natural threats and impacts to woodland ecosystems, including:
  - animals/insects, e.g. ring barking by grey squirrel, oak processionary moth
  - fungal, e.g. Ganoderma, Chalara
  - invasive plants and shrubs, e.g. rhododendron, Spanish bluebell.

A2 Human impacts on trees, woods and forests

- Historical impacts, e.g. shipbuilding, charcoal for iron/gunpowder manufacture, building, fuel, hunting (royal forests).
- Modern commercial impacts through use of forest resources, e.g. paper, construction/carpentry timber, biofuel/firewood.
- Conservation/deforestation.
- Biosecurity:
  - how tree pathogens and pests can spread diseases, and controls on these
  - importance of cleaning clothing and equipment.
- Leisure and recreation, e.g. woodland trails, horse riding, activity centres, camping/hiking.
- Development, e.g. housing, transport.
- Consequences of human impacts, including:
  - positive impacts, e.g. sustainable primary resource, carbon positive, global trade, conservation, increasing genetic diversity and population of tree species, increasing biodiversity, protection of significant species, habitats and ecosystems, greater accessibility to nature, enhanced aesthetic value
  - negative impacts, e.g. deforestation, increased flood risk, loss of biodiversity.

Learning aim B: Carry out practical woodland investigation

Learners will carry out appropriate tasks to investigate the ecology of woodland, relating them to human needs.

B1 Practical woodland investigations

- Measuring trees:
  - equipment used, e.g. girth tape, clinometer, relascope
  - height and girth
  - estimating amount of canopy, volume of timber
  - biosecurity control measures, cleaning and disinfection of clothing, personal protective equipment (PPE), tools, equipment and vehicles.
- Practical identification of trees and shrubs using form and structure, for example leaves, branches, fruit and bark.
- Seasonal variation in factors affecting identification, e.g. identification from bark, branch arrangement of deciduous trees during winter, identification of buds during spring.
- Using keys and guides to aid identification.
- Identifying associated plant and animal species.
- Using a national vegetation classification standard/system to classify UK woodlands, e.g. Joint Nature Conservation Committee's (JNCC) National Vegetation Classification (NVC).
- Impact of trees on habitat characteristics, including variation in:
  - light/shade
  - soils, e.g. type, pH
  - moisture, e.g. humidity, soil moisture
  - temperature
  - wind speed and direction.
- Equipment used for field measurement of habitat characteristics, e.g. soil thermometer, moisture sensor, anemometer, pH meter.
- Comparing woodland habitat characteristics of contrasting woodlands, e.g. mixed broadleaf/coniferous, ancient semi-natural woodlands, coppice.
- Identifying natural and human impacts.

B2 Meeting human needs

- Trees, woodlands and forests are a primary industry providing sustainable and essential resources around the world.
- Investigating how forests and woodlands can improve human health and wellbeing:
  - enrichment, e.g. carving
  - food for humans/farmed animals, e.g. hazelnuts, wood pigeon
  - health, e.g. access to green/natural spaces, leisure and recreation activities, herbal/plant remedies
  - shelter, e.g. construction materials
  - warmth/heat, e.g. fuelwood, charcoal
  - water, e.g. plant respiration collection, leaf run-off.
- Impacts on sustainability of woodland ecosystems through over exploitation to meet human needs, e.g. soil erosion, increased surface run-off, loss of species.

B3 Recording woodland investigations

- Reviewing the process of completing tasks and investigations.
- Reporting on findings, e.g. logbook, written report, blog, presentation.

Transferable skills/behaviours

Developing practical and technical skills

- Demonstrating practical woodland identification of species.

Managing information

- Research of ecosystem processes, global biomes, biodiversity and sustainability and global industry.

Problem solving

- Using woodland resources to meet needs.

Working with others

- Working with others to carry out practical woodland investigations.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Explore natural and human impacts on tree ecology and forest biodiversity		
A.P1 Describe the characteristics of global and UK woods and forests.	**A.M1** Explain how natural and human impacts alter the characteristics of tree ecology and forest biodiversity.	**A.D1** Evaluate the effects of human and natural impacts on woodland ecology and forest biodiversity.
A.P2 Describe human and natural impacts on tree ecology and forest biodiversity.		
Learning aim B: Carry out practical woodland investigation		
B.P3 Undertake accurate tree identification and UK woodland classification.	**B.M2** Undertake two appropriate UK woodland investigations to consider how their ecosystems meet human needs, recording results.	**B.D2** Undertake comprehensive investigations comparing and contrasting how two UK woodland ecosystems meet human needs, reviewing outcomes from investigations.
B.P4 Describe how UK woodlands can meet human needs.		
B.P5 Record findings of two tree classification and woodland investigations in an appropriate format.		

Essential information for assessment decisions

Learning aim A

For distinction standard, learners will:

- produce comprehensive information on how natural and human impacts can affect the ecology and biodiversity of woodland and forests. They will give valid reasons to support evidence of impacts on local and global forests, relating them to named tree and animal species associated with different ecosystems.

For merit standard, learners will:

- produce detailed information on how natural and human impacts can affect local and global woodland and forest ecosystems, relating findings to named species and ecosystem processes. They will give specific examples of positive and negative impacts.

For pass standard, learners will:

- produce information on how the characteristics of climate, soil and tree species indicate the presence of tropical, temperate and taiga forests
- provide basic information on how tree ecology can be impacted by historical and modern human factors, as well as natural fungal and invasive plant factors. They will include some detail on how these factors affect forests on both local and global scales.

Learning aim B

For distinction standard, learners will:

- carry out comprehensive practical woodland investigations in two contrasting woodlands to determine their classification. They will give fully reasoned explanations for their decisions using evidence from practical investigations of their ecosystems
- correctly and consistently identify and measure UK trees and shrubs in the field, including seasonal variations
- review how contrasting woodlands can meet human needs, demonstrating a clear understanding of the sustainability of woodlands to meet those needs. They will use fully reasoned examples from their practical investigations to illustrate, report and review their findings.

For merit standard, learners will:

- carry out practical woodland investigations in two contrasting woodlands to determine their classification
- correctly and consistently identify and measure UK trees and shrubs, in the field, using the aid of identification keys and guides to determine their classification
- use their practical investigations to explain and report on how woodland ecosystems can meet human needs and the potential impacts on sustainability from meeting those needs.

For pass standard, learners will:

- identify and measure eight key local tree and shrub species accurately in the field, using identification keys and guides
- use the findings of practical woodland investigations in two contrasting woodlands to determine their classification
- produce basic information on how woodlands can contribute to human needs of shelter, warmth, food, health and enrichment
- record in an appropriate format, for example a written report, field notebook, blog, presentation or logbook, the findings of tree identification, woodland classification and examples of how two different woodlands meet human needs for shelter, warmth, water, food, health and/or enrichment.

Assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity. *Section 6* gives information on setting assignments and there is further information on our website.

A suggested structure for summative assessment is shown in the *Unit summary* section, along with suitable forms of evidence. This is for illustrative purposes only and can therefore be adapted to meet local needs or to assess across units where suitable opportunities exist. The information in the *Links to other units* section will be helpful in identifying opportunities for assessment across units.

The following scenario could be used to produce the required evidence for this unit. Centres are free to use comparable scenarios or other forms of evidence provided that they meet the assessment requirements of the unit.

Suggested scenario

You are part of a team that provides survival training for a variety of customers, including schools, businesses and the military.

You are investigating a number of new sites for their potential to offer training for local schools as part of their outdoor activities programme. The programme will include a combination of adventure and educational activities.

Your task is to investigate the ecology of two woodlands and use that information to suggest activities that will be included in the programme. You will write a report that includes:

- the ecology of the two woodlands
- the potential for 'survival' activities, suggesting specific tasks pupils could carry out
- any potential impacts that using the woodlands might have on biodiversity or sustainability.

Students who take the course will also receive a small booklet that provides information on how trees, woods and forests (linked to a minimum of two different woodlands) are used globally to meet the demands of the range of human activity. This booklet will be used by the students as part of their geography and science studies in school. You will need to provide the research for this booklet, and you have been given five headings that will be used.

- Trees, Woods and Forests – What are they? – Where are they?
- What lives in woods?
- How do plants and animals affect woods?
- How important are our woods and forests?
- Why do we need to look after our woods and forests?

If a retake is necessary, an alternative example must be used. The following is an example of a retake assessment activity.

Learners will carry out similar tasks for different woodlands.

Further information for tutors and assessors

Delivery guidance

The following are examples of practical activities and workshops that tutors could use when developing sector and transferable skills in the delivery of this unit. Wherever possible, practical activities should be used to help learners develop both personal and sector skills in preparation for the final assessment. These suggestions are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

Learners are introduced to the unit through practical activities that require them to investigate trees, woods and forests in the field. They should be encouraged to:

- examine plants and animals associated with common trees, for example the insects living on the bark of an oak tree, plants found under and around trees
- identify features of trees and shrubs in the field
- examine human and natural impacts, for example how a forest track affects the habitat either side; signs of deer damage, fungal growths.

Suggested time: about 2 hours.

Activity: Woodland comparisons

Learners need to understand the woodland/forest ecosystem. This is best taught through a combination of practical activities and classroom teaching supported by learner research. Field activities might include investigations looking at variations in:

- light levels between different woods, parts of different locations within woods
- soil characteristics between a broadleaf and a coniferous woodland
- plant assemblages under/near different trees or on ride edges
- amount of canopy cover
- height, girth, age of trees.

Practical investigations will help learners identify habitat characteristics, recognise species and understand what relationships and interactions occur.

Classroom-based knowledge should add the breadth and depth to learners' practical investigations. Concepts not easily explained in the field should be explored, particularly when exploring global biomes.

Individual research should focus on good-quality sources that relate fieldwork to basic ecosystem principles and processes, including biodiversity/sustainability.

Suggested time: about 4 hours.

Activity: Impacts on trees, woods and forests

Learners carry out practical investigations of both natural and human impacts on woodland ecosystems, providing a good basis for further development in the classroom and individual research. Learners would benefit from recognising:

- common, harmful fungi, e.g. Ganoderma, honey fungus (Armillaria)
- bark stripping by squirrel/deer
- damage to soils caused by heavy forest machinery
- replanting schemes
- areas where forest operations have been carried out, e.g. thinning, clear felling, coppicing.

Classroom/research activities could include investigations into the causes/impacts of:

- global deforestation
- Northern Powerhouse Rail – High Speed 3
- green belt housing developments
- UK environmental regulatory bodies, e.g. Environment Agency, flood alleviation through woodland management.

Suggested time: about 4 hours.

Activity: Practical investigations 1

Learners develop their practical skills for several purposes:

- tree/shrub identification. The aim should be for learners to recognise key identification factors for specific trees and shrubs to enable rapid and accurate identification of the most common species. This could include recognising, for example:
  - triple black terminal bud of ash
  - fruit of horse chestnut versus sweet chestnut
  - distinctive leaf shapes.

It is also useful for learners to learn to distinguish similar features, for example leaf variations between oak species.

Working from clearly identified species will make it easier for learners to develop more sophisticated identification skills. This should include plant assemblages that will enable more accurate classification of woodland types using the readily available JNCC classification.

The JNCC NVC allows learners to relate tree and plant assemblages to arrive at a recognised industry standard of classification. It is probably best to edit the guide to limit learner choice to known woodlands in the area to be studied.

Suggested time: about 4 hours.

Activity: Practical investigations 2

This activity is concerned with exploring the ways that trees, woods and forests can be used to meet human needs. Learners will benefit from direct practical exploration, and this is an area where specialist trainers can have a significant impact on their learning. The more ambitious centre might organise a survival day where learners, under supervision, use the woodland ecosystem to meet their immediate needs for shelter, food, warmth and water.

Other activities could include:

- charcoal burning
- green woodworking
- fungi/plant foraging for food/medicinal properties.

The emphasis is on learners recognising that woodlands are extremely important for human activity but that ecosystems are fragile, and finding sustainable solutions to meeting human needs requires careful management.

Learners should develop the habit of keeping a logbook, blog or other record of the tasks they carry out, and these can be used for formative assessment.

Learners will need to gain experience of different woodlands, and for assessment purposes they will need to explore two contrasting woodlands.

Suggested time: about 4 hours.

Essential resources

For this unit, learners will need access to two contrasting woodland ecosystems.

Links to other units

This unit has strong links to:

- Unit 1: Introduction to Working in Land-based Industries
- Unit 2: Introduction to Plant and Soil Science
- Unit 3: Tree Work Placement
- Unit 7: Practical Tree Work Skills.

Employer involvement

This unit would benefit from employer involvement in the form of:

- guest speakers and practitioners
- work experience, in particular, placements with organisations involved in the management of woodlands.

Unit 7: Practical Tree Work Skills

Level: **2**

Unit type: **Mandatory**

Assessment type: **Internal Synoptic**

Guided learning hours: **60**

Unit in brief

Learners plan and carry out tree establishment and maintenance, selecting appropriate tools, equipment and materials, and using them safely and efficiently.

Unit introduction

Over 10% of the area of the United Kingdom is covered with trees, and this is increasing. Although there are many specialised machines to manage our forests and woodlands, basic tree work skills are essential.

In this unit, you will learn how to plan, prepare, plant and maintain trees using basic hand and powered tools. You will be able to select trees for a given purpose and establish them correctly to ensure they thrive. You will use the skills and knowledge that you gain in this unit, and other units in the qualification, to ensure that you work safely and that you have an awareness of environmental concerns.

This unit will prepare you for employment in the forestry and arboriculture industries and could lead to further related qualifications.

Learning aims

In this unit you will:

A Plan tree establishment and maintenance requirements

B Select and prepare tools and equipment for tree establishment and maintenance

C Undertake tree establishment and maintenance.

Unit summary

Learning aim	Key teaching areas	Summary of suggested assessment evidence
A Plan tree establishment and maintenance requirements	**A1** Tree establishment and maintenance needs **A2** Tools, materials and equipment	Tree works project. Learners will provide a portfolio of evidence that could include: • a tree plan for a specified site/purpose • a logbook • observation records • a written report/review.
B Select and prepare tools and equipment for tree establishment and maintenance	**B1** Health and safety **B2** Selection and preparation of tools and equipment	
C Undertake tree establishment and maintenance	**C1** Ground-based practical tree establishment **C2** Ground-based practical tree maintenance	

Key teaching areas in this unit include:

Sector skills	Knowledge	Transferable skills/behaviours
• Selection, preparation and use of tools, equipment and materials for ground preparation, and tree planting and maintenance	• Knowledge of tree types and species to plan tree planting and maintenance • Health and safety legislation	• Developing practical and technical skills • Managing information • Preparing for work

Unit content

Knowledge and sector skills

Learning aim A: Plan tree establishment and maintenance requirements

A1 Tree establishment and maintenance needs

Common operations for tree planting, establishment and maintenance.

- Tree planting and establishment needs:
  - three- to five-year establishment plan (planting plan, instruction sets, spacing, layout, species-specific maintenance needs, seasonal requirements)
  - suitability of site for tree planting – site survey (space, aspect and moisture availability), soil survey (pH, structure, mineral composition, soil type, drainage and compaction), future issues (salt, flooding and waterlogging), habitat survey (of pre-existing plants and wildlife, e.g. to avoid disturbance)
  - species selection (site requirements, management objectives, e.g. conservation, commercial, recreation, development)
  - suitability of species for contrasting sites or habitats, e.g. green belt/brown field, urban/rural, woodland/grassland
  - common size terms for tree plantings, e.g. whips, standards, maidens
  - ground preparation, planting, beating-up
  - weed control (chemical, mulching, by hand), importance of timing
  - protection against physical damage of plantings and existing plants (checking stakes, guys, tree shelters/guards)
  - irrigation
  - monitoring (beat-up assessment, pests, disease, mammal damage, physical damage)
  - mammal damage monitoring.
- Tree maintenance needs:
  - formative pruning, e.g. double leaders, crossing branches
  - secondary pruning
  - cleaning to ensure success of chosen crop
  - re-spacing
  - tree guard/shelter removal.
- Recognition of common threats:
  - fungal, e.g. Chalara fraxinea, Ganoderma spp., Inonotus hispidus, Phytophthora spp., Chondrostereum purpureum
  - insect, e.g. Aphids, Agrilus biguttatus, Thaumetopoea processionea, Cameraria ohridella
  - disease, e.g. Pseudomonas syringae, Erwinia amylovora, Xylella fastidiosa
  - mammalian, e.g. rabbit, squirrel, deer damage
  - human, e.g. vandalism, fly-tipping, off-road vehicles, visitor pressure.

A2 Tools, materials and equipment

Tools, equipment and materials commonly used for planting, establishing and maintaining trees.

- Tools, e.g. planting spade, lump hammer, pruning saws, secateurs, loppers, pole pruners.
- Powered tools, e.g. powered pole pruner, strimmer, brushcutter, rotavator.
- Personal protective equipment (PPE) (gloves, steel-toe-capped boots, goggles, ear defenders).
- Materials, e.g. stakes, ties, tree shelters/guards, perforated irrigation pipes, mulch mats.
- Equipment, e.g. wheelbarrow, measuring tapes, weed-control sprayer.
- Soil and nutrient testing kits.

Learning aim B: Select and prepare tools and equipment for tree establishment and maintenance

B1 Health and safety

- Influence of current and relevant laws, regulations and codes of practice:
  - Health and Safety at Work etc. Act 1974
  - Provision and Use of Work Equipment Regulations 1998 (PUWER)
  - tree preservation orders, trees in conservation areas
  - regulations on land use/infrastructure obstruction
  - British Standards linked to trees: BS 5837:2012, BS 8545:2014
  - UK Forestry Standard (UKFS)
  - risk assessment.

B2 Selection and preparation of tools and equipment

- Factors affecting selection of tools, materials and equipment, to include:
  - suitability for site and planned operations
  - cost
  - availability
  - ease of use
  - health and safety considerations, e.g. use of chemicals, powered tools
  - environmental impact, e.g. use of heavy machinery, noise pollution.
- Preparation of tools, equipment and materials for given operations, including:
  - pre-operation checks to ensure correct working
  - in-use maintenance, e.g. sharpening, spare batteries/fuel for powered tools
  - correct storage and transport of plantings and other materials, e.g. mulch, fuel
  - correct transport of tools and equipment, e.g. use of tool bags, boxes.
- Selection and correct use of personal protective equipment (PPE).

Learning aim C: Undertake tree establishment and maintenance

C1 Ground-based practical tree establishment

- Establishment, to include:
  - preparing the site
  - soil management, e.g. altering nutrient and pH levels; avoiding compaction, erosion
  - planting trees
  - irrigation
  - beat-up assessments
  - weeding
  - protection of plantings and pre-existing plants and wildlife
  - monitoring for pests, disease, damage.

C2 Ground-based practical tree maintenance

- Maintenance, to include:
  - formative and secondary pruning/dead wooding
  - cleaning
  - re-spacing
  - beating-up
  - tree guard/shelter removal
  - monitoring soil nutrients, pH
  - waste management, e.g. disposal of leavings/arisings.
  - use of sustainable practices, e.g. short rotation coppicing
  - flooding/erosion alleviation measures, e.g. ditch clearance, use of cover plants.

Transferable skills/behaviours

Developing practical and technical skills

- Carrying out tree planting and maintenance operations.

Managing information

- Using information about ground conditions, tree types, species and purpose to make informed decisions about tree planting and maintenance.

Preparing for work

- Planning tree plantings, selecting and preparing tools, equipment and materials.

Assessment criteria

Pass	Merit	Distinction
Learning aim A: Plan tree establishment and maintenance requirements		
A.P1 Inspect site characteristics, recording correct tree establishment and maintenance needs.	**A.M1** Inspect site characteristics and record site needs accurately to plan tree establishment and maintenance tasks to meet given habitat, environmental and site objectives.	**A.D1** Confidently inspect site characteristics and record detailed site needs accurately to produce justified planning for establishment and maintenance of trees to meet given habitat, environmental and site objectives.
A.P2 Plan tree planting and maintenance correctly to meet given habitat, environmental and site objectives.		
Learning aim B: Select and prepare tools and equipment for tree establishment and maintenance		
B.P3 Identify risks correctly prior to tree works.	**B.M2** Select and prepare correct tools and equipment effectively, producing a detailed and accurate assessment of risks for planned tree establishment and maintenance tasks.	**B.D2** Justify selected tools and equipment and assessment of risks for planned tree establishment and maintenance tasks, explaining consequences of choices.
B.P4 Select tools and equipment appropriately for specific tree establishment and maintenance tasks.		
Learning aim C: Undertake tree establishment and maintenance		
C.P5 Under supervision, safely carry out tree establishment and maintenance tasks correctly to meet given habitat, environmental and site objectives.	**C.M3** Under supervision, carry out tree establishment and maintenance tasks effectively to an agreed standard, reviewing process and outcomes with reference to feedback from others.	**C.D3** Under supervision, carry out tree establishment and maintenance tasks confidently and efficiently, reviewing processes and outcomes with reference to feedback from others and recommending improvements to inform future practice.
C.P6 Review own tree establishment and maintenance work appropriately using feedback from others.		

Essential information for assessment decisions

Objectives for tree planting and maintenance must be identified by the tutor/supervisor in accordance with the requirements of the site, quality of outcomes expected and time taken to complete the tasks.

Learning aim A

For distinction standard, learners will:

- confidently carry out effective site inspections and detailed recording of tree establishment and maintenance needs. This will include detailed and well-researched identification of needs linked to likely outcomes if needs are not addressed. Findings are clear and unambiguous
- use inspection findings and research to plan four specific tree work tasks – two establishment tasks plus two maintenance tasks, which meet given objectives. Planning includes planting and maintenance specifications, instruction sets and their reasoning and learners will explain the impact of tasks on the existing habitat and wider environmental issues, for example pollution, public access, biodiversity.

For merit standard, learners will:

- carry out tree site inspections, with some assistance, to identify new tree needs and maintenance needs of standing trees in relation to four different scenarios. They will assess the needs and provide accurate findings
- use inspection findings including, for example, soil characteristics of the site and research to plan four specific tree work tasks – two establishment tasks plus two maintenance tasks. Planning must include planting and maintenance specifications or other instruction sets, which meet objectives in terms of safe working practice, timescales and accuracy and environmental impacts, and are agreed with the tutor/supervisor.

For pass standard, learners will:

- plan and carry out appropriate tree site pre-planting and post-planting inspections, with assistance, for two contrasting sites
- plan the maintenance requirements for planted trees
- plan selected and correct establishment and maintenance tasks, with assistance, that meet objectives given in terms of safe working practice, timescales and accuracy and environmental impacts.

Learners will integrate their skills and understanding of safe working practices and sustainability and diversification objectives when carrying out site inspections from *Unit 1: Introduction to Working in Land-based Industries*, tree establishment and maintenance from *Unit 2: Introduction to Plant and Soil Science* and sustainability and human and/or natural environmental impacts from *Unit 6: Ecology of Trees, Woods and Forests*.

Learning aim B

For distinction standard, learners will:

- accurately assess risks, with minimal assistance, identifying hazards in detail and thoroughly risk assessing them. They will provide detailed information on the possible consequences of not assessing risks, including impacts on existing plants, wildlife and the environment
- provide detailed reasons for the selection of tools and equipment, giving in-depth information on the consequences of choices made
- confidently select tools and equipment, fully justifying selections with valid reasons.

For merit standard, learners will:

- accurately assess risks in relation to tree works and the environment, with some assistance, identifying hazards and correctly risk assessing them
- confidently select tools and equipment for two tree planting tasks and two tree maintenance tasks, giving some reasons for each.

For pass standard, learners will:

- identify hazards and assess risks in relation to tree establishment and maintenance with assistance
- select tools and equipment for two tree planting tasks and two tree maintenance tasks.

Learners will integrate their skills and understanding of hazards, risks and safe working practices from *Unit 1: Introduction to Working in Land-based Industries*; tree establishment and maintenance from *Unit 2: Introduction to Plant and Soil Science*; the selection of tools, equipment and machinery from *Unit 4: Tree Felling and Ground-based Operations*, *Unit 5*: *Assisting Tree Climbing and Aerial Pruning Operations* and *Unit 6: Ecology of Trees, Woods and Forests*.

Learning aim C

For distinction standard, learners will:

- handle and plant two trees of different types, with minimal assistance, providing detailed information on how these meet given objectives
- carry out maintenance of two trees requiring different techniques, with minimal assistance, providing detailed information on how these meet given objectives in terms of safe working practice, good waste management and good environmental practice, timescales and accuracy
- review progress and outcomes of tree works carried out, giving well-reasoned explanations linked to the quality of methodology and outcomes, using feedback from supervisors/tutors to a great degree
- explain how improvements to the work they carried out and the outcomes could affect future practice positively.

For merit standard, learners will:

- establish two trees of different types, with some assistance, providing some information on how these meet given objectives
- carry out maintenance of two trees requiring different techniques, with some assistance, providing some information on how these meet given objectives in terms of safe working practice, good environmental practice, timescales and accuracy and waste management
- assess the progress of tree works carried out, explaining the quality of methodology and outcomes based on feedback from supervisors/tutors.

For pass standard, learners will:

- plant two trees of different types, for example whip and standard, with assistance, to meet given objectives
- carry out maintenance of two trees requiring different techniques, for example pruning fruit trees or coppicing hazel, with assistance, to meet given objectives in terms of safe working practice, good environmental practice, timescales and accuracy and disposing of waste as directed
- review the progress of tree establishment and maintenance carried out, describing how well they did and the outcomes, based on feedback received from supervisors/tutors.

Learners will integrate their skills and understanding of safe working practices and sustainability and diversification objectives from *Unit 1: Introduction to Working in Land-based Industries*; tree establishment and maintenance from *Unit 2: Introduction to Plant and Soil Science*; the selection of tools, equipment and machinery from *Unit 4: Tree Felling and Ground-based Operations* and *Unit 5*: *Assisting Tree Climbing and Aerial Pruning Operations*; and knowledge of different trees from *Unit 6: Ecology of Trees, Woods and Forests*.

Assessment activity

The summative assessment activity takes place after learners have completed their formative development. The activity should be practical, be set in a realistic scenario and draw on learning from the unit, including the transferable skills. You will need to give learners a set period of time and number of hours in which to complete the activity. *Section 6* gives information on setting assignments and there is further information on our website.

A suggested structure for summative assessment is shown in the *Unit summary* section, along with suitable forms of evidence. This is for illustrative purposes only and can therefore be adapted to meet local needs or to assess across units where suitable opportunities exist. The information in the *Links to other units* section will be helpful in identifying opportunities for assessment across units.

The following scenario could be used to produce the required evidence for this unit. Centres are free to use comparable scenarios or other forms of evidence provided that they meet the assessment requirements of the unit.

Suggested scenario

A landowner wants a small area of bare ground planted up. You have been asked to carry out a site inspection to determine suitable tree species that could be recommended. You will then plant up the area.

Over the past 15 years, the landowner has planted new areas of new trees and has asked you to plan and carry out any required maintenance for one of these areas.

If a retake is necessary, an alternative example must be used. The following is an example of a retake assessment activity.

Alternative sites could be used requiring different tree types/species and maintenance techniques.

Further information for tutors and assessors

Delivery guidance

The following are examples of practical activities and workshops that tutors could use when developing sector and transferable skills in the delivery of this unit. Wherever possible, practical activities should be used to help learners develop both personal and sector skills in preparation for the final assessment. These suggestions are not intended as a definitive guide to cover the full GLH of the unit.

Introduction to unit

Practical activity: Introduction to tree planting and pruning

Introduce the unit through the simple planting of whips and, for example, pruning a stand of willow coppice. Each to be preceded and followed by classroom discussion that includes the tools, equipment and materials used, health and safety, and the processes involved. This will allow learners to gain a quick overview of the unit content.

Note: risk assessment, health and safety and correct selection and use of PPE should be included as part of every practical activity to ensure a culture of safe working is developed.

Suggested time: about 6 hours.

Activity: Tree size types and species

Through a combination of classroom and practical activities, learners explore the types of tree plantings available, for example whips, standards, maidens and the suitability of different species to suit purpose and site conditions.

Learners could develop their knowledge through individual research based on scenarios provided by the tutor, in which learners have to make appropriate selections.

Suggested time: about 4 hours.

Activity: Working safely

Through classroom and practical activities, learners are introduced to the use of risk assessments, health and safety legislation and the selection and use of PPE. This could be explored through a combination of tutor presentations, paper exercises (for example reading/completing a risk assessment), staged practical scenarios (for example identifying hazards, risks and control measures while working) and individual research into legislation.

Suggested time: about 4 hours.

Activity: Tools, equipment and materials

Through a combination of classroom and practical activities, learners explore the types of tools, materials and equipment used for planning, preparation, planting and maintenance.

Learners could develop their knowledge through individual research based on scenarios provided by the tutor, in which learners have to make appropriate selections.

Suggested time: about 4 hours.

Activity: Meaningful employer engagement: visiting practitioner

1. A woodsperson or other practitioner discusses the factors that affect the choice of tree planting suitable for a specified site. This could be through a practical site visit or classroom based. The discussion would include:

- choice of tree species
- tools, equipment and materials
- aftercare.

2. The discussion is followed by a practical site visit where new planting is to be established. Learners discuss and write up a planting plan.

Suggested time: about 6 hours.

Practical activity: Site preparation and planting

Tutor-led instruction/demonstration on preparing a new site for planting. This will include the main areas specified in the unit content, for example laying out, weed/undergrowth removal, planting and immediate aftercare (for example irrigation, staking, support). The practical instruction/demonstration is followed by learners carrying out their own practical preparation and planting, working individually or in pairs. Learners will select and use tools, equipment and materials safely.

Suggested time: about 6 hours.

Classroom-based investigation/individual research: pests, diseases, damage

Tutor-led presentation on pests, disease and damage that can affect trees. This is followed by individual research into identifying types of pests, disease and damage commonly found in trees and establishing causes, symptoms and remedies. Learners to prepare a simple factsheet for each from a list provided by the tutor.

Suggested time: about 4 hours.

Practical activity: Field investigation of pests, diseases and damage

Learners investigate the identification and impact of pests, disease and damage in the field. It may not be possible to cover the full range, but learners should have some hands-on experience in addition to the tutor presentation and their own research. Learners could record their findings in a field notebook.

Suggested time: about 4 hours.

Practical activity: Tree maintenance

Through tutor demonstration/instruction followed by practical activities, learners experience the range of tree maintenance operations specified in the unit content. This will include:

- formative and secondary pruning
- beating-up and weed control
- removal of shelters/guards
- disposal of leavings/arisings.

Learners will select and use tools, materials and equipment safely.

Suggested time: about 6 hours.

Practical activities: Planning, site preparation, planting and maintenance

Learners carry out further activities, developing their skills in the main areas of the unit content and in preparation for assessment. Tutors should encourage learners to become more independent and able to work unsupervised where possible. Learners should develop their skills and competence in the four main areas of assessment, namely:

1. planning for tree planting and maintenance
2. site preparation
3. tree planting and immediate aftercare
4. tree maintenance.

Practical activities to be followed by classroom discussion and further development through individual research; topics could include, for example the cost of tools, equipment and materials; appropriate legislation; use of written risk assessments; types of tree plantings and species.

Suggested time: about 8 hours.

Assessment

Since most of the assessment is based on practical tasks carried out, this will need to be included within the 60 Guided Learning Hours assigned to the unit. In addition, learners would probably need directed, non-guided hours to produce evidence for the assignment(s).

Suggested time: about 8 hours.

Essential resources

For this unit, learners will need access to:

- an area of land suitable for tree planting and maintenance
- tools, materials and equipment suitable to perform a variety of tree planting and maintenance operations.

Links to other units

The table below illustrates how knowledge, understanding and skills from units across this qualification provide links to *Unit 7: Practical Tree Work Skills*.

Unit	**Synoptic links to Unit 7: Practical Tree Work Skills**
Unit 1: Introduction to Working in Land-based Industries	• Using understanding of safe working practices when working in a forestry or arboricultural environment. • Using understanding of sustainability when working in a forestry or arboricultural environment. • Using understanding of diversification when working in a forestry or arboricultural environment.
Unit 2: Introduction to Plant and Soil Science	• Using understanding of the physical needs and health issues of trees and tree work. • Using understanding of how an external environment will influence tree establishment and growth.
Unit 3: Tree Work Placement	• Using the work skills and behaviours developed in a real working environment. • Working safely with and around trees
Unit 4: Tree Felling and Ground-based Operations	• Selecting, maintaining and safely using machinery when working in a forestry or arboricultural environment. • Preparing sites appropriately.
Unit 5: Assisting Tree Climbing and Aerial Pruning Operations	• Selecting and maintaining tools and equipment and assisting others to climb trees and prune at height. • Preparing sites appropriately.
Unit 6: Ecology of Trees, Woods and Forests	• Carrying out practical woodland research. • Developing understanding of natural and human impacts on trees.

Employer involvement

This unit would benefit from employer involvement in the form of:

- guest speakers such as practitioners in the field
- design/ideas to contribute to unit assignment/case study/project materials
- work experience
- own materials and case studies as exemplars
- support from local tree work businesses as mentors.

4 Planning your programme

Is there a learner entry requirement?

As a centre, it is your responsibility to ensure that recruited learners have a reasonable expectation of success on the programme. There are no formal entry requirements but we expect learners to have qualifications at or equivalent to Level 1.

Learners are most likely to succeed if they have:

- three or four GCSEs at intermediate grades and/or
- BTEC qualification(s) achieved at least at Level 1
- at least Level 1 equivalent achievement in English and mathematics through GCSE or Functional Skills.

Learners may demonstrate ability to succeed in various ways. For example, learners may have relevant work experience or specific aptitude shown through diagnostic tests or non-education experience.

What is involved in becoming an approved centre?

All centres must be approved before they can offer this qualification – so that you are ready to assess learners and so that we can provide the support needed. Further information is given in *Section 7 Administrative arrangements*.

What level of sector knowledge is needed to deliver this qualification?

We do not set any requirements for tutors but expect centres to assess the overall skills and knowledge of the teaching team to ensure that they are relevant and up to date with current industry practice. This will give learners a rich programme to prepare them for progression.

What resources are required to deliver this qualification?

As part of your centre approval, you will need to show that the necessary material resources and workspaces are available to deliver the qualification. For some units, specific resources are required.

What makes good vocational teaching?

The approach to vocational teaching must be led by what is right for the particular sector. Therefore, each unit includes delivery guidance and suggested assessment tasks. Using the delivery guidance and suggested assessment tasks, and our additional free delivery guidance and assignment briefs, you can build a course that contextualises learning in real-life and/or employment scenarios. This will naturally draw in the kind of broader attributes valued in the sector, for example teamwork when ascending trees, as well as the more general skills needed in work that fit well with project-based learning, for example independent learning.

What are the requirements for meaningful employer involvement?

This qualification has been designed as a Technical Diploma qualification and as an approved centre you are required to ensure that during their study, every learner has access to meaningful activity involving employers. See *Section 2 Structure* and *Section 8 Quality assurance* for the requirements for employer involvement.

Support for employer involvement

It is important that you give learners opportunities which are of high quality and that are directly relevant to their study. We will support you in this through our guidance materials and by giving you examples of best practice. See *Section 10 Resources and support* for details of the support available, including the Work Experience Toolkit.

What support is available for delivery and assessment?

We provide a wealth of support materials, including schemes of learning, delivery plans, assignment briefs and examples of marked learner work.

To support you with planning your assessments, you will be allocated a Standards Verifier early in the planning stage. There will be extensive training programmes and support from our Subject Advisor team.

For further details see *Section 10 Resources and support*.

How will my learners become more employable through this qualification?

Learners will be acquiring the key technical and sector knowledge, and practical and technical skills that employers need. Employability skills, such as teamworking and communication, and completing realistic tasks have been built into the design of the learning aims and content. This gives tutors the opportunity to use relevant contexts, scenarios and materials to enable learners to develop a portfolio of evidence that demonstrates the breadth of their skills and knowledge in a way that equips them for employment.

5 Assessment structure

The Pearson BTEC Level 2 Technical Diploma in Forestry and Arboriculture is assessed using *internal assessments* which are set and marked by tutors.

We have taken great care to ensure that the assessment method chosen is appropriate to the content of the unit and is in line with requirements from employers.

In developing an overall plan for delivery and assessment for the programme, you will need to consider the order in which you deliver units, whether delivery is over short or long periods and when assessment can take place.

6 Internal assessment

This section gives an overview of the key features of internal assessment and how you, as an approved centre, can offer it effectively. The full requirements and operational information are given in the Pearson *Quality Assurance Handbook* available on our website. All members of the assessment team need to refer to this document.

For this qualification, it is important that you can meet the expectations of stakeholders and the needs of learners by providing a programme that is practical and applied. You can tailor programmes to meet local needs and use links with local employers and the wider vocational sector.

When internal assessment is operated effectively, it is challenging, engaging, practical and up to date. It must also be fair to all learners and meet national standards.

Principles of internal assessment

Our approach to internal assessment for this qualification offers flexibility in how and when you assess learners, provided that you meet assessment and quality assurance requirements. You will need to take account of the requirements of the unit format, which we explain in *Section 3 Units*, and the requirements for delivering assessment given in *Section 7 Administrative arrangements*.

Operating internal assessment

The assessment team

It is important that there is an effective team for internal assessment so that all assessment is planned and verified. For this qualification, it is likely that the team will be small but it is still necessary to ensure that the assessment process is followed. Full information is given in the Pearson *Quality Assurance Handbook*.

The key roles are:

- the Lead Internal Verifier (Lead IV) for the qualification has responsibility for the planning, record keeping and standard setting for the qualification. The Lead IV registers with Pearson annually and organises training using our support materials
- Internal Verifiers (IVs) check that assignments and assessment decisions are valid and that they meet our requirements. In a small team, all people will normally be assessors and IVs. No one can verify their own actions as an assessor
- assessors set or use assignments to assess learners to national standards.

Planning and record keeping

The Lead IV should make sure that there is a plan for assessment of the internally-assessed units and maintain records of assessment undertaken. The key records are:

- verification of assignment briefs
- learner authentication declarations
- assessor decisions on assignments, with feedback given to learners
- verification of assessment decisions.

Examples of records and further information are given in the Pearson *Quality Assurance Handbook*.

Effective organisation

Internal assessment needs to be well organised so that learners' progress can be tracked and so that we can monitor that assessment is being carried out in line with national standards. We support you through, for example, providing training materials and sample documentation. Our online myBTEC service can help support you in planning and record keeping. Further information on using myBTEC can be found in *Section 10 Resources and support* and on our website.

It is particularly important that you manage the overall assignment programme and deadlines to make sure that learners are able to complete assignments on time.

Learner preparation

To ensure that you provide effective assessment for your learners, you need to make sure that they understand their responsibilities for assessment and the centre's arrangements.

From induction onwards, you will want to ensure that learners are motivated to work consistently and independently to achieve the requirements of the qualification. Learners need to understand how assignments are used, the importance of meeting assignment deadlines and that all the work submitted for assessment must be their own.

You will need to give learners a guide that explains how assignments are used for assessment, how assignments relate to the teaching programme and how they should use and reference source materials, including what would constitute plagiarism. The guide should also set out your approach to operating assessment, such as how learners must submit work and request extensions.

You are encouraged to employ a range of formative assessment approaches before putting learners through to the assignments to formally assess the units. Formative assessment supports teaching and learning, and should be ongoing throughout the learning process. It enables tutors to enhance learning by giving learners constructive feedback so that they can identify their strengths and weaknesses, and to put measures in place to target areas that need work. Formative assessment approaches that incorporate reflective learning and regular skills assessment are important in encouraging self-development and reflective practice, to ensure that learners progress.

Setting assignments

An assignment is issued to learners as an assignment brief with a defined start date, a completion date and clear requirements for the evidence that they need to provide. This assignment will be separate from the practice and exploration activities that have been used during the learning period, and learners must understand that the assignment is being used to judge the learning aims. There may be specific, observed practical components during the assignment period. Assignments can be divided into tasks and may require several forms of evidence. A valid assignment will enable a clear and formal assessment outcome, based on the assessment criteria.

When setting your assignments, you need to work with the information given in the *Essential information for assessment decisions* and the *Assessment activity* sections of the units. You can choose to use the suggested scenarios or to adapt them to take account of local circumstances, provided that assignments are verified.

In designing your own assignment briefs you should bear in mind the following points.

- A learning aim must always be assessed as a whole and must not be spilt into two or more tasks.
- Assignments must be structured to allow learners to demonstrate the full range of achievement at all grade levels. Learners need to be treated fairly by being given the opportunity to achieve a higher grade if they have the ability.
- Learners should be given clear tasks, activities and structures for evidence; the criteria should not be given as tasks.
- You must ensure that assignments for synoptic assessment are designed to enable learners to draw on the specific units identified and demonstrate that they can identify and use effectively an appropriate selection of skills, techniques, concepts, theories and knowledge in an integrated way. Assignments for the synoptic unit will be monitored at programme level as part of the standards verification process to ensure that they encourage learners to select and apply their learning from across the qualification in an integrated way.
- Where there is a requirement for assessment to be conducted in the real work environment (mandatory work placement), assignments must be designed to facilitate this. Where there is no mandatory requirement for workplace assessment but learners will be in work placement or work experience settings as a part of the programme, then it would be worthwhile if these assignments were also designed for completion in the real work environment. You must ensure that the work placement or work experience setting gives learners the opportunity to achieve at all grade levels.

As assignments provide a final assessment, they will draw on the specified range of teaching content for the learning objective. The specified teaching content is compulsory. The evidence for assessment need not cover every aspect of the teaching content as learners will normally be given particular examples, case studies or contexts in their assignments. For example, if a learner is carrying out a practical performance, then they must address all the relevant range of content that applies in that instance.

An assignment brief should have:

- a vocational scenario or context that motivates the learner to apply their learning through the assignment
- an audience or purpose for which the evidence is being provided
- clear instructions to the learner about what they are required to do, normally set out through a series of tasks.

Forms of evidence

The units allow for a variety of forms of evidence to be used, provided that they are suited to the type of learning aim and the learner being assessed. For most units, the practical demonstration of skills is necessary. The units give you information on suitable forms of evidence that would give learners the opportunity to apply a range of transferable and sector skills. Centres may choose to use different suitable forms for evidence to those proposed. Overall, learners should be assessed using varied forms of evidence.

The main forms of evidence include:

- observation and recordings of practical tasks or performance in the workplace with supporting evidence
- projects
- recordings of role play, interviews and other types of simulated activity
- oral or written presentations with assessor questioning
- work logbooks and reflective journals.

It is important to note that an observation record is a source of evidence and does not confer an assessment decision. It must be sufficiently detailed to enable others to make a judgement about the quality and sufficiency of the performance and must document clearly the rationale for the assessment decision. Observation records should be accompanied by supporting evidence, which may take the form of videos, audio recordings, photographs, preparation notes, learner logs and other similar types of record.

The form(s) of evidence selected must allow:

- the learner to provide all the evidence required for the learning aim(s) and the associated assessment criteria at all grade levels
- the learner to produce evidence that is their own independent work
- a verifier to independently reassess the learner to check the assessor's decisions.

Centres need to take particular care in ensuring that learners produce independent work.

Making valid assessment decisions

Assessment decisions through applying unit-based criteria

Assessment decisions for this qualification are based on the specific criteria given in each unit and set at each grade level. The way in which individual units are written provides a balance of assessment of sector-specific knowledge, technical and practical skills, and transferable skills appropriate to the purpose of the qualification.

Pass, Merit and Distinction criteria all relate to individual learning aims. The assessment criteria for a unit are hierarchical and holistic where, in satisfying the M criteria, a learner would also have satisfied the P criteria. The unit assessment grid shows the relationships of the criteria so that assessors can apply all the criteria to the learner's evidence at the same time.

Assessors must show how they have reached their decisions using the criteria in the assessment records. When a learner has completed all the assessment for a unit then the assessment team will give a grade for the unit. This is given according to the highest level for which the learner is judged to have met all the criteria. Therefore:

- to achieve a Distinction, a learner must have satisfied all the Distinction criteria (and all the Pass and Merit criteria)); these define outstanding performance across the unit as a whole
- to achieve a Merit, a learner must have satisfied all the Merit criteria (and all the Pass criteria) through high performance in each learning aim
- to achieve a Pass, a learner must have satisfied all the Pass criteria for the learning aims, showing coverage of the unit content and therefore attainment at Level 2 of the national framework.

The award of a Pass is a defined level of performance and cannot be given solely on the basis of a learner completing assignments. Learners who do not satisfy the Pass criteria should be reported as Unclassified.

Making assessment decisions using criteria

As an assessor, you review authenticated learner work and make judgements on standards using the assessment criteria and the supporting information provided in units and training materials. The evidence from a learner can be judged using all the relevant criteria at the same time. The assessor needs to make a judgement against each criterion that evidence is present and sufficiently comprehensive.

Assessors should use the following information and support in reaching assessment decisions:

- the *Essential information for assessment decisions* section in each unit
- your Lead IV and assessment team's collective experience, supported by the standardisation materials we provide.

Once the team has agreed the outcome, a formal assessment decision is recorded and reported to learners. The information given:

- must show the formal decision and indicate where criteria have been met
- may show where attainment against criteria has not been demonstrated
- avoid giving direct, specific instructions on how the learner can improve the evidence to achieve a higher grade.

Authenticity of learner work

Assessors must ensure that evidence is authentic to a learner through setting valid assignments and supervising them during the assessment period. Assessors must take care not to provide direct input, instructions or specific feedback that may compromise authenticity.

Once an assessment has begun, learners must not be given feedback that relates specifically to their evidence and how it can be improved, learners must work independently.

An assessor must assess only learner work that is authentic, i.e. learners' own independent work. Learners must authenticate the evidence that they provide for assessment through signing a declaration stating that it is their own work.

Assessors must complete a declaration that:

- the evidence submitted for this assignment is the learner's own
- the learner has clearly referenced any sources used in the work
- they understand that false declaration is a form of malpractice.

Centres can use Pearson templates or their own templates to document authentication.

During assessment, an assessor may suspect that some or all of the evidence from a learner is not authentic. The assessor must then take appropriate action using the centre's policies for malpractice. Further information is given in *Section 7 Administrative arrangements*.

Resubmission of improved evidence

An assignment provides the final assessment for the relevant learning aims and is normally a final assessment decision, except where the Lead IV approves one opportunity to resubmit improved evidence based on the completed assignment brief.

The Lead IV has the responsibility to make sure that resubmission is operated fairly. This means:

- checking that a learner can be reasonably expected to perform better through a second submission, for example that the learner has not performed as expected
- making sure that giving a further opportunity does not give an unfair advantage over other learners, for example through the opportunity to take account of feedback given to other learners
- checking that the learner will be able to provide improved evidence without further guidance and that the original evidence submitted remains valid.

Once an assessment decision has been given to the learner, the resubmission opportunity must have a deadline within 15 working days in the same academic year.

For assessment to be fair, it is important that learners are all assessed in the same way and that some learners are not advantaged by having additional time or the opportunity to learn from others. Therefore, learners who did not complete assignments by your planned deadline or an authorised extension deadline, if one was given for specific circumstances, may not have the opportunity to subsequently resubmit. Similarly, learners who submit work that is not their own should not be given an opportunity to resubmit.

The outcome of any resubmission of the assignment by the learner is then recorded as the final decision.

A learner who has not achieved their expected level of performance in the relevant learning aims **after resubmission** of an assignment may be offered a single retake opportunity using a new assignment. The highest grade that may be awarded is a Pass.

The Lead IV must authorise a retake with a new assignment only in exceptional circumstances and where it is necessary, appropriate and fair to do so. For further information on offering a retake opportunity you should refer to the *BTEC Centre Guide to Internal Assessment* available on our website. We provide information on writing assignments for retakes on our website (please go to www.btec.co.uk/keydocuments).

7 Administrative arrangements

Introduction

This section focuses on the administrative requirements for delivering a BTEC qualification.
It will be of value to Quality Nominees, Lead IVs, Programme Leaders and Examinations Officers.

Learner registration and entry

Shortly after learners start the programme of learning, you need to make sure that they are registered for the qualification and that appropriate arrangements are made for internal assessment. You need to refer to our *Information Manual* for information on making registrations for the qualification.

Learners can be formally assessed only for a qualification on which they are registered. If learners' intended qualifications change, for example if a learner decides to choose a different pathway specialism, then the centre must transfer the learner appropriately.

Access to assessment

Internal assessments need to be administered carefully to ensure that all learners are treated fairly and that results and certificates are issued on time to allow learners to progress to chosen progression opportunities.

Our equality policy requires that all learners have equal opportunity to access our qualifications and assessments, and that our qualifications are awarded in a way that is fair to every learner. We are committed to making sure that:

- learners with a protected characteristic (as defined by the Equality Act 2010) are not, when they are undertaking one of our qualifications, disadvantaged in comparison to learners who do not share that characteristic
- all learners achieve the recognition they deserve for undertaking a qualification and this achievement can be compared fairly to the achievement of their peers.

Further information on access arrangements can be found in the Joint Council for Qualifications (JCQ) document *Access Arrangements, Reasonable Adjustments and Special Consideration for General and Vocational Qualifications*.

Administrative arrangements for internal assessment

Records

You are required to retain records of assessment for each learner. Records should include assessments taken, decisions reached and any adjustments or appeals. Further information can be found in our *Information Manual.* Records must be maintained as specified as we may ask to audit them.

Reasonable adjustments to assessment

To ensure that learners have fair access to demonstrate the requirements of the assessments, a reasonable adjustment is one that is made before a learner takes an assessment. You are able to make adjustments to internal assessments to take account of the needs of individual learners. In most cases, this can be achieved through a defined time extension or by adjusting the format of evidence. We can advise you if you are uncertain as to whether an adjustment is fair and reasonable. You need to plan for time to make adjustments if necessary.

Further details on how to make adjustments for learners with protected characteristics are given on our website in the document *Supplementary guidance for reasonable adjustments and special consideration in vocational internally assessed units*.

Special consideration

Special consideration is given after an assessment has taken place for learners who have been affected by adverse circumstances, such as illness. You must operate special consideration in line with our policy (see previous paragraph). You can provide special consideration related to the period of time given for evidence to be provided or for the format of the assessment if it is equally valid. You may not substitute alternative forms of evidence to that required in a unit or omit the application of any assessment criteria to judge attainment. Pearson can consider applications for special consideration only in line with the policy.

Appeals against assessment

Your centre must have a policy for dealing with appeals from learners. These appeals may relate to assessment decisions being incorrect or assessment being conducted unfairly. The first step in such a policy could be a consideration of the evidence by a Lead IV or other member of the programme team. The assessment plan should allow time for potential appeals after assessment decisions have been given to learners. If there is an appeal by a learner you must document the appeal and its resolution. Learners have a final right of appeal to Pearson but only if the procedures that you have put in place have not been followed. Further details are given in the document *Enquiries and appeals about Pearson vocational qualifications and end point assessment policy.*

Dealing with malpractice in assessment

Malpractice means acts that undermine the integrity and validity of assessment, the certification of qualifications, and/or that may damage the authority of those responsible for delivering the assessment and certification.

Pearson does not tolerate actions (or attempted actions) of malpractice by learners, centre staff or centres in connection with Pearson qualifications. Pearson may impose penalties and/or sanctions on learners, centre staff or centres where incidents (or attempted incidents) of malpractice have been proven.

Malpractice may arise or be suspected in relation to any unit or type of assessment within the qualification. For further details regarding malpractice and advice on preventing malpractice by learners, please see our *Centre guide for dealing with malpractice and maladministration in vocational qualifications*, available on our website.

Internally-assessed units

Centres are required to take steps to prevent malpractice and to investigate instances of suspected malpractice. Learners must be given information that explains what malpractice is for internal assessment and how suspected incidents will be dealt with by the centre. Our *Centre guide for dealing with malpractice and maladministration in vocational qualifications* gives full information on the actions we expect you to take.

Pearson may conduct investigations if we believe that a centre is failing to conduct internal assessment according to our policies. The above document gives further information, examples and details the penalties and sanctions that may be imposed.

In the interests of learners and centre staff, centres need to respond effectively and openly to all requests relating to an investigation into an incident of suspected malpractice.

Teacher/centre malpractice

Heads of Centres are required to inform Pearson's Investigations Team of any incident of suspected malpractice by centre staff, before any investigation is undertaken. Heads of centres are requested to inform the Investigations Team by submitting a *JCQ Form M2(a)* (available at www.jcq.org.uk/exams-office/malpractice) with supporting documentation to pqsmalpractice@pearson.com. Where Pearson receives allegations of malpractice from other sources (for example Pearson staff or anonymous informants), the Investigations Team will conduct the investigation directly or may ask the head of centre to assist.

Incidents of maladministration (accidental errors in the delivery of Pearson qualifications that may affect the assessment of learners) should also be reported to the Investigations Team using the same method.

Heads of Centres/Principals/Chief Executive Officers or their nominees are required to inform learners and centre staff suspected of malpractice of their responsibilities and rights; see Section 6.15 of the *JCQ Suspected Malpractice in Examinations and Assessments Policies and Procedures* document.

Pearson reserves the right in cases of suspected malpractice to withhold the issuing of results and/or certificates while an investigation is in progress. Depending on the outcome of the investigation results and/or certificates may be released or withheld.

You should be aware that Pearson may need to suspend certification when undertaking investigations, audits and quality assurances processes. You will be notified within a reasonable period of time if this occurs.

Sanctions and appeals

Where malpractice is proven, we may impose sanctions or penalties.

Where learner malpractice is evidenced, penalties may be imposed such as:

- disqualification from the qualification
- being barred from registration for Pearson qualifications for a period of time.

If we are concerned about your centre's quality procedures, we may impose sanctions such as:

- working with you to create an improvement action plan
- requiring staff members to receive further training
- placing temporary blocks on your certificates
- placing temporary blocks on registration of learners
- debarring staff members or the centre from delivering Pearson qualifications
- suspending or withdrawing centre approval status.

The centre will be notified if any of these apply.

Pearson has established procedures for centres that are considering appeals against penalties and sanctions arising from malpractice. Appeals against a decision made by Pearson will normally be accepted only from Heads of Centres (on behalf of learners and/or members or staff) and from individual members (in respect of a decision taken against them personally). Further information on appeals can be found in our *Enquiries and appeals about Pearson vocational qualifications and end point assessment policy*, which is on our website. In the initial stage of any aspect of malpractice, please notify the Investigations Team by email via pqsmalpractice@pearson.com who will inform you of the next steps.

Certification and results

Once a learner has completed all the required units for a qualification, even if final results for external assessments have not been issued, then the centre can claim certification for the learner, provided that quality assurance has been successfully completed. For the relevant procedures please refer to our *Information Manual*. You can use the information provided on qualification grading to check overall qualification grades.

Results issue

Qualification results will be issued once a learner has completed all components of the qualification and you have claimed certification. The result will be in the form of a grade. You should be prepared to discuss performance with learners, making use of the information we provide and post-results services.

Additional documents to support centre administration

As an approved centre, you must ensure that all staff delivering, assessing and administering the qualifications have access to this documentation. These documents are reviewed annually and are reissued if updates are required.

- Pearson *Quality Assurance Handbook*: this sets out how we will carry out quality assurance of standards and how you need to work with us to achieve successful outcomes.
- *Information Manual*: this gives procedures for registering learners for qualifications, transferring registrations and claiming certificates.
- Regulatory policies: our regulatory policies are integral to our approach and explain how we meet internal and regulatory requirements. We review the regulated policies annually to ensure that they remain fit for purpose. Policies related to this qualification include:
  - adjustments for candidates with disabilities and learning difficulties, access arrangements and reasonable adjustments for general and vocational qualifications
  - age of learners
  - centre guidance for dealing with malpractice
  - recognition of prior learning and process.

This list is not exhaustive and a full list of our regulatory policies can be found on our website.

8 Quality assurance

Centre and qualification approval

As part of the approval process, your centre must make sure that the resource requirements listed below are in place before offering the qualification.

- Centres must have appropriate physical resources (for example, equipment, IT, learning materials, teaching rooms) to support the delivery and assessment of the qualification.
- Staff involved in the assessment process must have relevant expertise and/or occupational experience.
- There must be systems in place to ensure continuing professional development for staff delivering the qualification.
- Centres must have in place appropriate health and safety policies relating to the use of equipment by learners.
- Centres must deliver the qualification in accordance with current equality legislation.
- Centres should refer to the teacher guidance section in individual units to check for any specific resources required.

Continuing quality assurance and standards verification

On an annual basis, we produce the Pearson *Quality Assurance Handbook*. It contains detailed guidance on the quality processes required to underpin robust assessment, internal verification and planning of appropriate employer involvement.

The key principles of quality assurance are that:

- a centre delivering BTEC programmes must be an approved centre, and must have approval for the programmes or groups of programmes that it is delivering
- the centre agrees, as part of gaining approval, to abide by specific terms and conditions around the effective delivery and quality assurance of assessment; it must abide by these conditions throughout the period of delivery
- Pearson makes available to approved centres a range of materials and opportunities, through online standardisation, intended to exemplify the processes required for effective assessment, and examples of effective standards. Approved centres must use the materials and services to ensure that all staff delivering BTEC qualifications keep up to date with the guidance on assessment
- an approved centre must follow agreed protocols for standardisation of assessors and verifiers, for the planning, monitoring and recording of assessment processes, and for dealing with special circumstances, appeals and malpractice.

The approach of quality-assured assessment is through a partnership between an approved centre and Pearson. We will make sure that each centre follows best practice and employs appropriate technology to support quality-assurance processes, where practicable. We work to support centres and seek to make sure that our quality-assurance processes do not place undue bureaucratic processes on centres. We monitor and support centres in the effective operation of assessment and quality assurance.

The methods we use to do this for BTEC Technical Certificate and Diploma qualifications include:

- making sure that all centres complete appropriate declarations at the time of approval
- undertaking approval visits to centres
- making sure that centres have effective teams of assessors and verifiers who are trained to undertake assessment
- undertaking an overarching review and assessment of a centre's strategy for ensuring sufficient and appropriate engagement with employers at the beginning of delivery of any BTEC programme(s)
- undertaking a review of the employer involvement planned at programme level to ensure its appropriateness at a time when additional activities can be scheduled where necessary
- assessment sampling and verification, through requested samples of assessments, completed assessed learner work and associated documentation
- an overarching review and assessment of a centre's strategy for delivering and quality assuring its BTEC programmes.

Centres that do not fully address and maintain rigorous approaches to delivering, assessing and quality assurance cannot seek certification for individual programmes or for the BTEC Technical Certificate and Diploma qualifications. An approved centre must make certification claims only when authorised by us and strictly in accordance with requirements for reporting.

Centres that do not comply with remedial action plans may have their approval to deliver qualifications removed.

9 Understanding the qualification grade

Awarding and reporting for the qualification

This section explains the rules that we apply in providing an overall qualification grade for each learner. The final grade awarded for a qualification represents a holistic performance across all of the qualification. As the qualification grade is an aggregate of the total performance, there is some element of compensation in that a higher performance in some units will be balanced by a lower outcome in others.

Eligibility for an award

In order to be awarded the qualification, a learner must complete all units and achieve a Pass or above in all units. See *Section 2 Structure* for full details.

To achieve the qualification grade, learners must:

- achieve and **report a grade** (D, M or P) for all units within a valid combination
- achieve the **minimum number of points** at a grade threshold.

Where there are optional units in a qualification, it is the responsibility of the centre to ensure that a correct unit combination is adhered to. Learners who do not pass all the required units shown in the structure will not achieve the qualification. For example, learners who have not taken enough mandatory or optional units will not achieve that qualification even if they have enough points.

Calculation of the qualification grade

The final grade awarded for a qualification represents an aggregation of a learner's performance across the qualification. As the qualification grade is an aggregate of the total performance, there is some element of compensation in that a higher performance in some units may be balanced by a lower outcome in others.

In the event that a learner achieves more than the required number of optional units (where available), the mandatory units along with the optional units with the highest grades will be used to calculate the overall result, subject to the eligibility requirements for that particular qualification title.

The qualification is awarded at the grade ranges shown in the table below.

Qualification	Available grade range
Diploma	PP to DD

The *Calculation of qualification grade* table, shown further on in this section, shows the minimum thresholds for calculating these grades. The table will be kept under review over the lifetime of the qualification. The most up to date table will be issued on our website.

Pearson will monitor the qualification standard and reserves the right to make appropriate adjustments.

Learners who do not meet the minimum requirements for a qualification grade to be awarded will be recorded as Unclassified (U) and will not be certificated. They may receive a Notification of Performance for individual units. Our *Information Manual* gives full details.

Points available for internally-assessed units

The table below shows the number of **points** available for internally-assessed units. For each internally-assessed unit, points are allocated depending on the grade awarded.

	Unit size	
	30 GLH	**60 GLH**
U	0	0
Pass	8	16
Merit	12	24
Distinction	16	32

Claiming the qualification grade

Subject to eligibility, we will automatically calculate the qualification grade for your learners when the internally-assessed unit grades are submitted and the qualification claim is made. Learners will be awarded qualification grades for achieving the sufficient number of points within the ranges shown in the relevant calculation of qualification grade table for the cohort.

Calculation of qualification grade table

Diploma	
Grade	**Points threshold**
PP	96
MP	112
MM	128
DM	152
DD	176

The table is subject to review over the lifetime of the qualification.
The most up-to-date version will be issued on our website.

Examples of grade calculations based on table applicable to registrations from September 2018

Example 1: Achievement of a Diploma with a PP grade

Unit	GLH	Type	Grade	Points
1	60	Internal	Pass	16
2	60	Internal	Pass	16
3	60	Internal	Pass	16
4	60	Internal	Pass	16
5	30	Internal	Pass	8
6	30	Internal	Merit	12
7	60	Internal Synoptic	Pass	16
	360		**PP**	**100**

The learner has achieved a Pass or above in all units.

The learner has sufficient points for a PP grade.

Example 2: Achievement of a Diploma with a DD grade

Unit	GLH	Type	Grade	Points
1	60	Internal	Merit	24
2	60	Internal	Merit	24
3	60	Internal	Distinction	32
4	60	Internal	Distinction	32
5	30	Internal	Distinction	16
6	30	Internal	Distinction	16
7	60	Internal Synoptic	Distinction	32
	360		**DD**	**176**

The learner has sufficient points for a DD grade.

Example 3: Achievement of a Diploma with an Unclassified result

Unit	GLH	Type	Grade	Points
1	60	Internal	Merit	24
2	60	Internal	Merit	24
3	60	Internal	Unclassified	0
4	60	Internal	Pass	16
5	30	Internal	Pass	8
6	30	Internal	Pass	8
7	60	Internal Synoptic	Distinction	32
	360		**U**	**112**

The learner has a U in Unit 3.

The learner has sufficient points for an MP but has not met the requirement for a Pass, or above, in all units.

10 Resources and support

Our aim is to give you support to enable you to deliver Pearson BTEC Level 2 Technicals with confidence. You will find resources to support teaching and learning, assessing, and professional development on our website.

Support for setting up your course and preparing to teach

Schemes of Learning

Our free Schemes of Learning give you suggestions and ideas for how to deliver the units in the qualifications, including opportunities to develop employability skills, tips on embedding mathematics and English, and how to link units through holistic assessments.

Delivery planner

High-level models showing how the course can be delivered over different timescales, for example six months, one year, two years.

myBTEC

myBTEC is a free, online toolkit that lets you plan and manage your BTEC provision from one place. It supports the delivery, assessment and quality assurance of BTEC qualifications in centres and supports teachers with the following activities:

- checking that a programme is using a valid combination of units
- creating and verifying assignment briefs (including access to a bank of assignment briefs that can be customised)
- creating assessment plans and recording assessment decisions
- tracking the progress of every learner throughout their programme.

To find out more about myBTEC, visit the myBTEC page on the support services section of our website.

Support for teaching and learning

Work Experience Toolkit

Our free Work Experience Toolkit gives guidance for tutors, assessors, work-based supervisors and learners on how to make the most of work placements and work experience.

Pearson Learning Services provides a range of engaging resources to support BTEC qualifications.

Teaching and learning resources may also be available from a number of other publishers. Details of Pearson's own resources and of all endorsed resources are on our website.

Support for assessment

Sample assessment materials for internally-assessed units

We do not prescribe the assessments for the internally-assessed units. Rather, we allow you to set your own, according to your learners' preferences.

We provide assignment briefs approved by Pearson Standards Verifiers.

Sample marked learner work

To support you in understanding the expectation of the standard at each grade, examples of sample marked learner work will be made available on our website.

Training and support from Pearson

People to talk to

There are lots of people who can support you and give you advice and guidance on delivering your Pearson BTEC Level 2 Technicals. They include the following.

- Standards Verifiers – they can support you with preparing your assignments, ensuring that your assessment plan is set up correctly, in preparing learner work and providing quality assurance through sampling.
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