Institute for Apprenticeships & Technical Education

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

T Level outline content: draft version

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Contents

Introduction

Outline content

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

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

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

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

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

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

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

Core content

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

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

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

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

Element	Content
Sustainability	Key requirements of environmental legislation • associated obligations for businesses, their employees and other stakeholders. Key government environmental policies and initiatives • the opportunities and risks they bring to agriculture, environmental and animal care sector • the associated environmental performance measure e.g. water and energy use. The concept of sustainable development • sustainable development goals at a macro (national and international) and micro (business) level • types of sustainable solutions to meet development goals including social, environmental, economic and human • concerns and expectations of key stakeholders. The concept of climate change and scientific views on causes and impacts • the impact of increased rainfall and higher temperatures upon environments, conservation practices, habitats, flora, fauna and water levels • policies and initiatives to manage these changes at national and local level. Waste management principles (e.g. recycle, reduce, reuse) • key requirements of associated legislation • types of materials that require specific actions (e.g. asbestos) • measures in place by the sector and organisation to meet requirements.

Biosecurity	Principles of biosecurity • factors influencing biosecurity e.g. international trade, new technologies • biosecurity risk factors in different types of agriculture, environmental and animal care situations • biosecurity measures including inspection, monitoring, regulation, passports, isolation and their importance in maintaining health production and service environments.
Working in the agriculture, environmental and animal care sector	Employment rights and responsibilities (e.g. union membership, working hours) of the employer and employee • expectations of professional conduct and behaviours in the workplace (including punctuality, cleanliness, respect for own and others work and work area, respect for the land, property and belongings of others (including animals) • typical activities that can lead to disciplinary and grievance procedures • how these expectations are met and demonstrated by employees. Principles of effective teamwork • how teams are developed, including the role of the team leader • team dynamics and how they are managed, and behaviours influenced • qualities of effective team members and team leaders and how these qualities are demonstrated • the importance of team work to team and project performance • techniques used to monitor and manage individual and team performance e.g. goal and objective setting, performance management reviews, providing constructive feedback • techniques used to manage team conflict (e.g. mediation) and when and how they should be applied.

Working in the agriculture, environmental and animal care sector (continued)	Progression opportunities which exist within the agriculture, environmental and animal care sector • the purpose of continuing professional development (CPD) and the benefits it brings to the individual and their employer • methods of personal and professional development (e.g. coaching, independent research) and the types of organisations that can provide this type of support, including professional bodies. • their suitability for achieving planned outcomes.
Ethics	Ethical principles (e.g. honesty, transparency, justice) • how these are used in codes of conduct, employment terms and conditions and workplace policies • how these are represented by ethical behaviours • how these are incorporated into business ethics • how these impact on business operations, including interaction with stakeholders and the supply chain.
Supply Chain	The supply chain • different types of organisations involved and their role • different ways in which the supply chain is sequenced and operates • implications of failing to meet supply chain demands • environmental impact of the supply chain including whole life cycle of a product • types of procurement (e.g. competitive bidding, direct purchase) and their suitability for different situations. Principles of stock management (including stock rotation, storage, conditions, monitoring stock levels, ordering stock, dealing with deliveries, maintaining records) • how they are applied in different types of business • implications to businesses of ineffective processes.

Business	The types of business organisations e.g. sole trader, partnership, limited company, not for profit • common business structures and hierarchies • the financial, legal and commercial implications of type of business • typical organisational policies and their relationship to legislation • types of business objectives and values associated with different business structures. The principles of enterprise skills e.g. risk taking, innovation, resilience • how they are applied to develop business growth and change including sales opportunities and diversification of the business • types of business risk (e.g. financial, reputational) and risk management methods that can be deployed. How businesses measure success (including Key Performance Indicators (KPIs), Service Level Agreements (SLAs), benchmarking, supply chain requirements) • the information used to determine if success measures are met • quality standards, quality control and quality assurance ○ their purpose, differences and application to organisations quality standards expected by internal and external stakeholders and associated quality assurance requirements e.g. audits. The principles of project management (including purpose and scope of the project, milestones and timescales, supply chain, people management, resources, budgeting).
Equality	Factors to consider (including equality legislation, cultural differences, religious needs) when working with people from diverse backgrounds and cultures • how to show empathy and respect to those from different backgrounds and cultures to our own • acceptable and unacceptable behaviours and language. Characteristics protected by equality legislation.

Communication	Different types of communication (including verbal, non-verbal and digital) • the formats used for the types of communication (e.g. business reports, emails, letters, websites) and associated business conventions • the types and value of images and visual aids to support written text and oral presentations • their suitability for different purposes and audiences • the importance of spoken language, body language and tone in communication and how each is used to convey different messages to different audiences for different purposes • the benefits and limitations of social media including risk of misuse, promoting the business.
Relationship Management	Principles of customer care (including first impressions, representing business and self, supporting customers, the difference between customer wants and needs, the importance of accurate knowledge, working to an expected timescale) • how these can be applied when dealing with different stakeholders, including internal customers • legal requirements (including legislation relating to consumer protection) when interacting with different types of customers and customer relationships including business to business (B2B) • typical procedures used to deal with customer disputes and complaints, including escalation to relevant individuals and departments • how to apply customer service principles and the benefits to the individual (e.g. increased motivation, positive feedback) and business (e.g. customer loyalty, customer confidence). Roles of different stakeholders including internal and external customers • their expectations • interrelationships between stakeholders.

Finance	The concept of profit • types of profit (including net and gross) and significance of each to business success • types of cost incurred by business (products, ancillary products, types of overheads, labour), their classifications (direct, indirect, fixed, variable) • measures used to reduce costs and implications of using these to profitability, reputation and quality • types of taxation (including payroll, business) • how costs and revenue are forecast • how profit is calculated.
Health and Safety	Key requirements of health and safety legislation e.g. for lone working, safe manual handling • the respective duties imposed on employees and employers • the importance of taking personal responsibility for health and safety of self and others • the techniques and methods used to comply with legislation e.g. use of Personal Protective Equipment (PPE), regular communication with lone workers. The purpose of risk assessments • typical structures and content • how they are developed and used • implications for poor development and application. Hazards and risks associated with working in the agriculture, environmental and animal care sector (e.g. working with hazardous materials, lone working) • typical control measures in place to minimise risks, including the types of PPE used, fatigue and stress management for lone workers. Procedures to follow when dealing with emergency situations e.g. spilt cleaning materials, slurry exposure, flooding.

Information and data	Key requirements of legislation relating to the security of information and data • types of information and data protected by legislation including client data, intellectual property • methods used by businesses to manage information and data including version control, access controls, indexing, cyber security.

Employer-set project

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

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

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

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

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

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

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

- **Decision making**
    - e.g. identifying likely impact of skills scarcity in the business and using evidence to substantiate conclusions.
- **Investigating**
    - e.g. developing search criteria/queries for secondary research and designing and carrying out tests for primary research into the environmental impact of a business.
- **Working in a team**
    - e.g. developing and implementing a communication plan for the introduction of a new lone working policy.

Occupational Specialist Content

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

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

Occupational Specialist Content

Occupational Specialism: Crop production

Performance Outcome 1: Establish crops in field and container-based systems for optimum yield and quality

Students must demonstrate skills by establishing two different crops: one in field-based and one in container-based systems. Crops should cover 20 square metres for container-based systems and 50 metres by 10 metres for field-based systems.

Knowledge Specific to Performance Outcome	Skills
Health and safety Key requirements of health and safety legislation and the respective duties imposed on employees and employers including those relating to the safety of visitors. How employers ensure employees are aware of health and safety requirements. Key requirements of health and safety codes of practice and how they are applied when establishing crops. Contingency and emergency plans required for health and safety related incidents when establishing crops in different systems e.g. diesel spillages, electric shock. Principles of safe manual handling and their application when establishing crops. Purpose use and content of risk assessments. Typical hazards involved when establishing crops including lone working and controls in place to mitigate for these. **Environment**	***Skills applicable to both systems:*** Test condition of growing media e.g. soil texture, pH, electrical conductivity of substrate. Assess quality of planting materials e.g. seeds, plants. Set up equipment for the task e.g. calibrate. Capture environmental data e.g. temperature, climate. Interpret data. Estimate time required to scale up operations. Assess the suitability of machinery and equipment e.g. no health and safety hazards, clean. Set up equipment and machinery e.g. clean, apply grease. Manually lift and move materials, equipment or machinery. Apply aftercare to planted or transplanted crops. ***Skills applicable to field-based systems:*** Dig soil profile pit.

Key requirements of environmental legislations (including LERAPs) and implications for establishing crops. Potential positive (e.g. increasing biodiversity) and negative (e.g. soil erosion or refuse disposal) environmental effects of crop establishment decisions. The origins of different types of growing media and the potential impacts on the environment of their extraction, movement and use. The principles of soil, water, energy and pollution codes of practice and the implications of these for establishing crops. Typical malpractices (unethical, inefficient, illegal) when establishing crops and their potential negative effect on the environment. Typical and atypical pests, weeds and diseases associated with different crops that can occur in an environment, • their characteristics, symptoms and causes • techniques used to quantify their presence • pathological implications to the crops • potential impact on crop establishment, optimising yield, quality and the environment • how they are controlled including physical, chemical, cultural and biological methods. How hygiene practices are used to ensure biosecurity when establishing crops.	Operate a tractor in a straight line and to turn 180°. Spray chemicals to safely enable even coverage over a given space. Spread fertiliser to safely enable even coverage over a given space. Align crop to irrigation. Attach an implement to a tractor including electrical and hydraulic connections e.g. by three-point linkage, by pick-up hitch. Cultivate soil. Calibrate planting machinery for accurate spacing of planting material. Operate planting machinery specific to crop type. Measure with precision crop post-planting e.g. depth, soil contact. Calculate planting density. Monitor machine performance. Assess quality of planting operation undertaken by others. Provide constructive feedback to others orally. ***Skills applicable to container-based systems:*** Propagate plants by seed in pots • fill containers • firm growing media in containers • sow seeds • cover seeds Transplant seedlings.

The conditions and environments required for plant propagation • types of facilities including polytunnels, glasshouses and coldframes, outdoors, their characteristics, benefits and limitations for different purposes • conditions required for plant propagation (including light, sterility, humidity, irrigation, heat, ventilation) • techniques and equipment used to monitor and adapt conditions to support establishment in protected environments. **Information and data** Types of financial (e.g. yield per acre, direct and indirect costs) and crop production records (e.g. time, what was applied, what were the conditions) produced and how they are managed in the workplace. Key requirements of legislation relating to information and data. Types of data required to support crop establishment decisions (e.g. soil types, weather conditions) • how this is collected and measured • equipment required and how equipment it is operated • how data is recorded, presented and interpreted • how data is used to inform decision-making. **Machinery, equipment and technology**	Mix nutrients to recipe. Apply nutrients. Set environmental conditions. Irrigate crops.

Key requirements of legislation relating to the safe and effective use of crop establishment machinery and equipment. The operating principles of crop establishment machinery and equipment (e.g. shears, tractors, drones) and how they are operated safely and efficiently. Capabilities and limitations of crop establishment machinery and equipment and factors (including financial, efficiency, environmental) affecting their suitability in different situations and environments. How to maintain crop establishment machinery and equipment including cleaning, service intervals and storage. How to prepare and calibrate crop establishment machinery and equipment for use and implications of poor preparation for optimising crop yield and quality. How to use manufacturer's specifications, machinery handbooks and user's manuals to inform efficient operation and servicing of machinery and equipment. Common faults in crop establishment machinery and equipment • symptoms and typical causes • how their occurrence is minimised • how issues can be rectified. Developments in technology to support crop establishment (e.g. genetic engineering, GPS/satellite imagery) and how they can be used to establish crops and optimise their yield and quality. The relationship between machinery and soil structure and potential damage and	

benefits it can bring to crop establishment. **Crop science** Different types of crops (including cereals, grassland and forage, vegetables, fruits and nuts, ornamentals, industrial) their lifecycles, planting specifications and optimum conditions for establishment. Principles of crop rotation and the suitability of different approaches to meet specific objectives. Principles of plant growth and development for different types of crops including plant structures and their function. Types of planting material (including) seeds, seedlings, bulbs, tubers, saplings • quality characteristics required for planting and transplanting to support healthy growth (e.g. pest and disease free, root condition, certification). Growing media (including soil), their characteristics and how they can affect crop establishment for high yield and quality in different environments. Preparation techniques for the growing area (e.g. ploughing, levelling, applying nutrients, adapting soil structure) and how they are applied. Nutrients and hormones required by different types of crops • how they support crop establishment • how deficiencies are recognised in different forms of crop and	

implications of these to yield and quality • their sources (organic and inorganic). Propagation by seed • the suitability of seed propagation for a range of crops • timings of propagation by seed including seasons and germination times • seed treatments (e.g. stratification, scarification), their purpose, their suitability for different seeds, their application • techniques for sowing seeds (including small, medium and large seed) in containers and their application • aftercare requirements for sown seeds for different types of seeds (including mist benches, irrigation) to support germination and their application. Propagation by vegetative means • techniques for different vegetative propagation methods (including cuttings, ground layering, grafting, division) • the suitability of the types of vegetative propagation for a range of crops • timings of propagation by vegetative means including appropriate time of year and rooting periods	

• types of propagation material and factors that influence the selection including maturity and provenance • aftercare requirements of vegetative propagation (e.g. fogging units, heat application). Different forms of crop that can be used for crop establishment (including bulb, seed, seedling, small plant, tree, vine, root) • techniques used to plant and transplant these forms in different growing media • suitability of form and techniques for crop and growing area • how the techniques and forms impact on yield and quality. Methods of crop irrigation and their suitability for different growing media and environments and their effect on crop establishment. Types of aftercare used to support crop establishment after planting and transplanting (e.g. temperature manipulation, irrigation, formative pruning) in different growing media and environments • how they encourage independence in the landscape, growth and development • their implications for management, yield and quality • factors affecting their application (e.g. aspect, crop type) • how they are applied in after planting and transplanting.	

How environmental controls (e.g. temperature, humidity) are applied in establishing crops and implications for optimising yield and quality. Time allocation for the range of activities required to establish crops e.g. soil preparation, planting. **Business** The importance of yield and quality to a commercial business and how they are forecast and measured. Costs associated with crop establishment e.g. fixed, variable • how they are minimised to support profitable outcomes • typical profit margins • how profit is calculated. The crop production supply chain • different types of organisations involved and their role • different ways the supply chain operates for different types of crop production • types of contracts provided • associated quality standards • quality assurance requirements e.g. audits. How crop production organisations can diversify the types of crops produced and techniques, systems and media used within the space available.	

Performance Outcome 2: Manage crops in field and container-based systems to optimise yield and quality

Students must demonstrate skills by managing two different crops: one in field based and one in container-based systems. Skills can be assessed in relation to different growth stages.

Knowledge Specific to Performance Outcome	**Skills**
Health and safety Key requirements of health and safety codes of practice and how they are applied when managing crops. Contingency and emergency plans required for health and safety related incidents when managing crops in different systems e.g. toxic or harmful spillages, accident and injuries for individuals, fire. Principles of safe manual handling and their application when managing crops. Typical hazards involved when managing crops including crop spraying and controls in place to mitigate for these. **Environment** Key requirements of environmental legislations (including LERAPs) and implications for managing crops. Potential positive and negative environmental effects of actions undertaken to manage crops e.g. nutrient application, use of slug pellets. The principles of soil, water, energy and pollution codes of practice and the implications of these for managing crops. Typical malpractices (unethical, inefficient, illegal) when managing crops and their potential negative effect on the environment.	***Skills applicable to both systems:*** Measure emergence of crop. Determine crop progress e.g. growth stage. Calculate the establishment percentage. Measure root establishment. Monitor crop growth through a crop walk. Identify pests, diseases and/ or weeds. Quantify pests, diseases and/ or weeds. Apply cultural controls of pests e.g. predators. Apply cultural controls of weeds e.g. hand weeding. Identify atypical growth symptoms e.g. plant colour. Measure growing media moisture content. Determine irrigation requirement. Operate irrigation equipment. Engage in discussions with technical experts. Use questioning techniques to obtain and clarify information. Assess crops for potential adverse effects on yield. Forecast surplus/deficit yield against targets.

Typical and atypical pests, weeds and diseases associated with different crops that can occur in an environment • their characteristics, symptoms and causes • pathological implications to the crops • potential impact on crop management, optimising yield, quality and the environment • how they are controlled including physical, chemical, cultural and biological methods. How environmental controls (e.g. temperature, humidity) are applied in managing crops and implications for optimising yield and quality. How hygiene practices are used to ensure biosecurity when managing crops. **Information and data** Types of financial (e.g. cost of heating, cost of nutrients) and crop production records (e.g. updated yield projections, quality issues) produced and how they are managed in the workplace. Types of data required to support crop management decisions (e.g. soil types, weather conditions) • how this is collected and measured • equipment required and how equipment it is operated • how data is recorded, presented and interpreted • how data is used to inform decisions. How to maintain information and data digitally including the use of spreadsheet software and related applications.	Process data to support decision making. Assess suitability of information and data provided. Represent information and data using mathematical diagrams. Calculate crop/fruit balance. ***Skills applicable to field-based systems:*** Operate machinery to apply organic nutrients. ***Skills applicable to container-based systems:*** Measure irrigation runoff. Maintain crops e.g. training, disbudding, deleafing. Analyse and interpret environmental data to inform plant management decisions.

Machinery, equipment and technology Key requirements of legislation relating to the safe and effective use of crop management machinery and equipment. The operating principles of crop management machinery and equipment (e.g. sprayers, fertiliser applicators, hydraulic lifts, irrigation systems) and how they are operated safely and efficiently. Capabilities and limitations of crop management machinery and equipment and factors (including financial, efficiency, environmental) affecting their suitability in different situations and environments. How to maintain crop management machinery and equipment for use and implications of poor preparation for optimising crop yield and quality. How to prepare and calibrate crop management machinery and equipment for use and implications of poor preparation for optimising yield and quality. How to use manufacturer's specifications, machinery handbooks and user's manuals to inform efficient operation and servicing of machinery and equipment. Common faults in crop management machinery and equipment e.g. leaks, lack of oil • symptoms and typical causes • how their occurrence is minimised • how issues can be rectified. Developments in technology to support crop management (e.g. genetic engineering, GPS/satellite imagery) and how they can be used to manage crops and optimise their yield and quality.	

The relationship between machinery and soil structure and potential damage and benefits it can bring to yield and quality. **Crop science** Different types of crops (including cereals, grassland and forage, vegetables, fruits and nuts, ornamentals, industrial) their lifecycles, growing specifications and optimum conditions for growth. Principles of plant growth and development for different types of crops including plant structures and their function. Quality characteristics of healthy plants (including vigour, form, balance, root condition, soil condition, turgidity) • methods used to identify the characteristics (e.g. observation, records) • how quality affects management decisions. Growing media (including soil), their characteristics and how they can affect yield and quality in different environments. Nutrients, hormones and plant growth regulators required by different types of crops • how they support growth and development • how deficiencies are recognised in crops and implications of these to yield and quality • their sources (organic and inorganic). Practices used to manipulate crop growth and how they are applied to optimise yield and quality e.g. light manipulation, application of fertiliser.	

Methods of crop irrigation (e.g. sprinklers, rain guns) their suitability for different growing media and environments and their effect on yield and quality. Relationship between environmental conditions (including weather), plant protection methods and crop growth. Time allocation for the range of activities required to manage crops e.g. crop walking, nutrient application. **Business** The importance of yield and quality to a commercial business and how they are forecast and measured during the growth phase. Costs associated with crop management e.g. labour, materials and how they are minimised to support profitable outcomes. The crop production supply chain • different types of organisations involved and their role • different ways the supply chain operates for different types of crop production • types of contracts provided • associated quality standards • quality assurance requirements e.g. audits. Industry quality standards and assurances • implications to commercial businesses • audit processes involved in confirming compliance with requirements.	

Performance Outcome 3: Harvest crops for commercial markets

Knowledge Specific to Performance Outcome	Skills
Health and safety Key requirements of health and safety codes of practice and how they are applied when harvesting crops. Contingency and emergency plans required for health and safety related incidents e.g. injury from machinery and equipment, injury from transport. Principles of safe manual handling and their application when harvesting crops. Typical hazards involved in harvesting crops sharp cutting implements, heavy machinery and equipment and controls in place to mitigate for these. **Environment** Key requirements of environmental legislations and implications for harvest. Potential positive (increasing biodiversity) and negative (e.g. soil on the roads, run off) environmental effects resulting from harvesting. The principles of soil, water, energy and pollution codes of practice and the implications of these for harvesting crops. Typical malpractices (unethical, inefficient, illegal) when harvesting crops and their potential negative effect on the environment. Typical and atypical pests, weeds and diseases associated with different crops that can occur in an environment • their characteristics, symptoms and causes • pathological implications to the crops	***Skills applicable to both systems:*** Assess a sample of crop for yield and quality. Input, process, manipulate and interrogate data digitally. Apply physical dexterity using precise and controlled movements. Forecast crop yield. Prepare machinery for harvest. Operate harvest machinery e.g. tipping trailers, hydraulic lifts. Update harvesting records e.g. crop yield, crop quality. Clean storage buildings and facilities. Disinfect crop storage facilities. Assess a sample of harvested crops for quality. Apply the use of hand-held equipment (e.g. brush, hose) to tasks. Cost the harvesting of a crop. Identify steps involved in completing a complex task. Sequence and prioritise steps. Allocate resources (including people, equipment, materials and time) to steps. Manage own time to meet objectives. ***Skills applicable to field-based systems*** Assess the suitability of conditions for harvest.

• potential impact on crop harvesting, optimising yield, quality and the environment • how they are controlled including physical, chemical, cultural and biological methods. How hygiene practices are used to ensure biosecurity when harvesting crops. Different types of storage facilities e.g. boxed refrigerated, bulk grain store • their suitability for different types of crops and storage periods • contractual requirements • how effective storage is monitored. How different types of crops should be handled when harvested including different types of packaging (e.g. crates, pallets) and their suitability in relation to storage and transportation. **Information and data** Types of financial (e.g. yield per acre, loss from damage) and harvest records (e.g. quality standards) produced and how they are managed in the workplace. Types of data required to support crop harvesting decisions (e.g. fruit measurement, growth stage) • how this is collected and measured • equipment required and how equipment it is operated • how data is recorded, presented and interpreted • how data is used to inform decision-making.	***Skills applicable to container-based systems:*** Assess the suitability of a crop for harvest.

How to maintain information and data digitally including the use of spreadsheet software and related applications. **Machinery and equipment and technology** Key requirements of legislation relating to the safe and effective use of crop harvesting machinery and equipment. The operating principles of crop harvesting machinery and equipment (e.g. combine harvesters, knife) and how they are operated safely and efficiently. Capabilities and limitations of harvesting machinery and equipment and factors (financial, efficiency, environmental) affecting their suitability in different situations and environments. How to prepare and calibrate crop harvesting machinery and equipment for use and implications of poor preparation for optimising crop yield and quality. How to use manufacturer's specifications, machinery handbooks and user's manuals to inform efficient operation and servicing of machinery and equipment. Common faults in crop harvesting machinery and equipment • symptoms and typical causes • how their occurrence is minimised • how issues can be rectified. Developments in technology to support crop harvesting (e.g. yield mapping, autonomous vehicles) and how they can be used to support efficient and effective crop harvesting.	

The relationship between machinery and soil structure and potential damage and benefits it can bring to crop harvesting. **Crop science** Different types of crops (including cereals, grassland and forage, vegetables, fruits and nuts, ornamentals, industrial) their lifecycles, quality standards for harvesting and implications of harvesting on following crops. Growing media (including soil) and how they affect efficient harvesting. How environmental controls (e.g. temperature, humidity) are applied in harvesting, storing, packaging and transporting crops and implications for optimising yield and quality. How much time to allow for each activity involved when harvesting crops including harvesting, packaging, storage. **Business** The importance of yield and quality to a commercial business and how they are forecast and measured. Costs associated with crop harvesting and how they are minimised to support profitable outcomes. How to calculate cost of crop harvesting. The crop production supply chain • different types of organisations involved and their role • different ways the supply chain operates for different types of crop production • types of contracts provided • associated quality standards	

• quality assurance requirements e.g. audits.	

Performance Outcome 4: Maintain the areas surrounding the crop production environment

Skills can be demonstrated in relation to areas surrounding field-based or container-based crop production environments.

Knowledge Specific to Performance Outcome	Skills
Health and safety Contingency and emergency plans required for health and safety related incidents e.g. fumes in confined spaced, drowning in lakes. Principles of safe manual handling and their application when managing the non-production environment. Risks associated with utilities in non-productive areas e.g. electrical overhead wires, septic tanks, contaminated water storage and appropriate control measures. **Environment** Key requirements of environmental legislations (including LERAPs) and implications for non-production activities. Potential positive and negative environmental effects of non-production activities e.g. habitat creation, path erosion from additional visitors. Typical malpractices (unethical, inefficient, illegal) when undertaking non-production activities and the potential implications to the business and the production environment. Key requirements of waste legislation, regulations and codes of practice and how they are applied. **Business**	Clean the environment external environment e.g. power washing. Apply biosecurity PPE. Apply biosecurity measures when maintaining the area e.g. ensuring cleanliness of self when moving from one location to another. Assess a situation for potential adverse risks. Summarise information and ideas into standard forms and templates. Audit records e.g. against farm assurance quality criteria. Prepare surfaces for coating. Coat surfaces. Fix ironmongery to timber-based products. Cut timber-based products e.g. measure and saw lengths of wood. Join timber-based products e.g. nail two pieces of wood to repair a fence. Repair broken glass. Use hand and power tools, equipment and machinery to complete estate maintenance. Prune shrubs or trees. Cut back hedgerows. Create texts (e.g. notices, promotional material) for external stakeholders.

Costs of maintenance of non-productive areas and implications for profitability and business success. The relationship between costs, revenue and profit to a business • the different types of costs involved including taxation • how to price a product or service • how to maintain revenue records • how to conduct a cost/benefit analysis • how to calculate profits. Performance targets and how they are developed and applied in different situations. Principles and the application of stock management systems (including stock-rotation, storage conditions, monitoring stock levels, maintaining records) • how they are applied to harvesting of crops • the implications of failing to apply these principles when harvesting crops. Principles of customer service and how they are applied to customers and visitors to the business. The positive and negative perceptions people may have of the business and how to promote the positive aspects e.g. through social media, open days. The concepts of the actual and potential market including competition, how markets are targeted and methods of promotion that could be used by crop production businesses.	Use digital tools to communicate with others. Convey technical information to non-technical audiences. Maintain access routes e.g. clear debris, level aggregates. Repair masonry e.g. brickwork. Cut plastic pipework. Join plastic pipework. Clear drains with a pressure washer. Maintain ditches e.g. dig out existing materials. Maintain ponds e.g. trimming grass. Maintain field boundaries e.g. hedge, fence, field margin. Classify waste and allocate to storage. Audit stock e.g. seed / chemicals / fuels / nutrients / waste.

Opportunities for use of non-productive environments for financial benefit e.g. stewardship. **Estate management** Standards for maintenance of non-productive areas set by different standards setting bodies e.g. Red Tractor and implications for non-compliance. Types of boundaries, structures and surfaces in estates. The importance of habitat management (including removal of unwanted vegetation, clearance of waterways, protection and enhancement of boundaries, control of invasive species, promotion of beneficial species) and techniques applied to achieve these. Construction techniques used to maintain and repair boundaries (e.g. hedges, ditches, posts) building fabric (e.g. barn walls, doors), and surfaces (e.g. gravel, slabs). Risks to the non-productive and wider environment from the production activities e.g. biosecurity breaches, increased maintenance requirements. The potential effects of environmental control measures on productive and non-productive areas. **Machinery, equipment and technology** Key requirements of legislation relating to the safe and effective use of machinery and equipment e.g. power washers, sprayers. The operating principles of maintenance machinery and equipment (e.g. power tools, cleaning devices, monitoring	

equipment) and how they are operated safely and efficiently. Common faults in maintenance machinery and equipment • symptoms and typical causes • how their occurrence is minimised • how issues can be rectified. Techniques used to maintain equipment and machinery for use including storage, cleaning, calibration, visual and technical checks.	