

**City & Guilds Level 3 Certificate,
Subsidiary Diploma,
Extended Diploma in
Horticulture (0078-03)**



www.cityandguilds.com
February 2022
Version 2.3

Qualification handbook for centres

500/8402/1

500/8385/5

600/6115/7

500/8384/3

500/8401/X

A large, stylized graphic of a sunburst or flower-like shape in shades of yellow and gold, with the word "HORTICULTURE" written across it in a bold, white, sans-serif font. The text has a 3D effect with a dark shadow underneath. The background is white with faint, light-colored splatters and lines.

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City & Guilds Level 3 Certificate, Subsidiary Diploma Extended Diploma in Horticulture (0078-03)



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February 2022
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Qualification handbook for centres

Qualification title	Number	QAN
City & Guilds Level 3 Certificate in Horticulture	0078-03	500/8402/1
City & Guilds Level 3 Subsidiary Diploma in Horticulture	0078-03	500/8385/5
City & Guilds Level 3 90-Credit Diploma in Horticulture	0078-03	600/6115/7
City & Guilds Level 3 Diploma in Horticulture	0078-03	500/8384/3
City & Guilds Level 3 Extended Diploma in Horticulture	0078-03	500/8401/X

Version and date	Change detail	Section
2.2 August 2017	Unit 301 deleted from Level 3 Certificate in Horticulture QAN 500/8402/1 roc	Registration and certification
2.3 February 2022	GLH and TQT clarified and highlighted	Introduction

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Unit 317	Construct and Maintain Decorative Landscape Features	150
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Unit 319	Establish and Manage Interior Plant Displays	165
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Unit 321	Understand and Manage Landscape Restoration	180
Unit 322	Undertake Identification, Selection and Use of Ornamental Plants	187
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1 Introduction to the qualifications

This document contains the information that centres need to offer the following qualifications:

Qualification title and level	City & Guilds qualification number	Qualification accreditation number
City & Guilds Level 3 Certificate in Horticulture	0078-03	500/8402/1
City & Guilds Level 3 Subsidiary Diploma in Horticulture	0078-03	500/8385/5
City & Guilds Level 3 90-Credit Diploma in Horticulture	0078-03	600/6115/7
City & Guilds Level 3 Diploma in Horticulture	0078-03	500/8384/3
City & Guilds Level 3 Extended Diploma in Horticulture	0078-03	500/8401/X

Qualification summary

Qualification title and level	Credits	Guided Learning Hours (GLH)	Total Qualification Time (TQT)
City & Guilds Level 3 Certificate in Horticulture	30	180	300
City & Guilds Level 3 Subsidiary Diploma in Horticulture	60	360	600
City & Guilds Level 3 90-Credit Diploma in Horticulture	90	540	900
City & Guilds Level 3 Diploma in Horticulture	120	720	1200
City & Guilds Level 3 Extended Diploma in Horticulture	180	1080	1800

These qualifications meet the needs of learners in a centre-based environment who may wish to work within the horticultural industry or progress to further learning and/or training. These qualifications allow learners to develop underpinning knowledge whilst practising skills that could be used within employment in the horticulture industry. These qualifications replace the Level 3 Advanced National Certificate and Advanced National Diploma in Horticulture (0345-30 to -41) which expired on 31 July 2010 (QAN 500/4341/9 and 500/4342/0).

These qualifications were developed in association with Lantra SSC, Landex and the industry.

Specialist Learning (SL)

Specialist Learning (SL) offers young people the opportunity to study a particular topic in more depth or broaden their studies through complementary learning. The Level 3 Certificate and Subsidiary Diploma in Horticulture have been approved as SL by the Environmental and Land-based Diploma DDP and Ofqual for the Advanced Diploma in Environmental and Land-based Studies. They have been designed to:

- complement principal learning within the Advanced Diploma in Environmental and Land-based Studies
 - provide a broad background understanding of the Environmental and Land-based sector and an introduction to the practical skills and knowledge required
 - provide an awareness of the range of jobs and work settings in the Environmental and Land-based sector
- Level 3 Certificate, Subsidiary Diploma, 90-Credit Diploma, Diploma, Extended Diploma in Horticulture (0078-03)

1 Introduction to the qualifications

- enable learners to make an informed assessment of their own aptitude for work in this sector and to make informed decisions about careers
- encourage learners to reach a level of knowledge and skills that will facilitate progress into further vocational learning or to potential employment in the sector
- introduce learners to the discipline of the working environment and to encourage mature attitudes to the community in general
- encourage learners to value continued learning and remain in the learning process
- allow learners to learn, develop and practise selected skills required for progression in the sector
- provide opportunities for progression to the Advanced Diploma in Environmental and Land-based and other related qualifications in the sector.

1.1 Qualification structure

City & Guilds Level 3 Certificate in Horticulture

To achieve the **Level 3 Certificate in Horticulture**, learners are required to achieve a total of 30 credits from any combination of Optional units from the table below.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	Excluded combination of units (if any)
Optional units				
T6009579	351	Understand the Principles of Soil Science	5	
J6009974	309	Undertake Horticultural Production Techniques - Outdoors	10	
L6009975	310	Undertake Horticultural Production Techniques- Protected	10	
T6009842	312	Manage Plant Propagation Activities	10	
D6009849	315	Understand the Principles of Organic Crop Production	10	
T6009971	318	Establish and Manage Exterior Plant Displays	10	
F6009973	319	Establish and Manage Interior Plant Displays	10	
D6009981	320	Understand Historical Influences on the Development of Gardens	10	
H6009982	322	Undertake Identification, Selection and Use of Ornamental Plants	10	
M6009970	323	Maintain Turf in Parks and Gardens	10	
Y6009882	324	Undertake Site Surveying, Levelling and Setting Out	10	
D6009883	329	Prepare Landscape and Garden Design Briefs	10	
K6009885	330	Understand the Principles and Practices of Landscape and Garden Design	10	

K6009840	334	Manage Amenity Turf	10	
J6009859	342	Manage Winter and Summer Sports Turf Surfaces	10	
K6009921	346	Understand the Principles and Identify the Signs of Pests and Diseases of Trees	10	
F6009911	347	Undertake Tree and Shrub Pruning and Maintenance	10	
Y6009980	349	Understand and Carry Out Identification, Planting and Care of Trees	10	

City & Guilds Level 3 Subsidiary Diploma in Horticulture

To achieve the **Level 3 Subsidiary Diploma in Horticulture**, learners are required to achieve 10 credits from the mandatory units in the table below. The remaining 50 credits can be made up of any combination of optional units (only 1 unit (10 credits) can be achieved from units 334 – 341). A total of 60 credits are required to achieve the qualification.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	Excluded combination of units (if any)
Mandatory units				
L6009149	301	Understand the Principles of Plant Science	5	
T6009579	351	Understand the Principles of Soil Science	5	
Optional units				
M6010021	303	Undertake an Investigative Project in the Land-Based Sector	10	
M6009709	304	Business Management in the Land-based Sector	10	
H6009805	305	Undertaking Land-based Machinery Operations	10	
R6009847	308	Manage Advanced Nursery Stock Production	10	
J6009974	309	Undertake Horticultural Production Techniques-Outdoors	10	
L6009975	310	Undertake Horticultural Production Techniques-Protected	10	
T6009842	312	Manage Plant Propagation Activities	10	
F6009844	313	Manage Soil Water	5	
L6009863	314	Understand the Principles of Plant Health and Protection	5	
D6009849	315	Understand the Principles of Organic Crop Production	10	
T6009971	318	Establish and Manage Exterior Plant Displays	10	
F6009973	319	Establish and Manage Interior Plant Displays	10	
D6009981	320	Understand Historical Influences on the Development of Gardens	10	
H6009982	322	Undertake Identification, Selection and Use of Ornamental Plants	10	

M6009970	323	Maintain Turf in Parks and Gardens	10	
Y6009882	324	Undertake Site Surveying, Levelling and Setting Out	10	
A6009955	326	Construct Horizontal Landscape Surfaces	10	
H6009948	327	Construct and Maintain Timber Landscape Features	10	
D6009950	328	Construct and Restore Walls	10	
D6009883	329	Prepare Landscape and Garden Design Briefs	10	
K6009885	330	Understand the Principles and Practices of Landscape and Garden Design	10	
L6009846	331	Understand the Principles of Advanced Horticultural Science	10	
M6009922	332	Construct and Establish Sports and Amenity Turf Areas	10	
K6009840	334	Manage Amenity Turf	10	
Y6009848	335	Manage Sports Turf Surfaces – Bowling Greens	10	
D6009852	336	Manage Sports Turf Surfaces – Cricket	10	
R6009850	337	Manage Sports Turf Surfaces – Association Football	10	
H6009853	338	Manage Sports Turf Surfaces – Golf	10	
M6009855	339	Manage Sports Turf Surfaces – Horseracing	10	
A6009857	340	Manage Sports Turf Surfaces – Rugby Pitches	10	
F6009858	341	Manage Sports Turf Surfaces – Tennis	10	
J6009859	342	Manage Winter and Summer Sports Turf Surfaces	10	
M6009919	343	Undertake Computer Aided Design in Horticulture, Treework and Blacksmithing	10	
R6009962	344	Undertake Contract Management in Land-based Industries	10	

K6009921	346	Understand the Principles and Identify the Signs of Pests and Diseases of Trees	10	
F6009911	347	Undertake Tree and Shrub Pruning and Maintenance	10	
A6009843	348	Undertake Advanced Arboricultural Practices	10	
Y6009980	349	Understand and Carry Out Identification, Planting and Care of Trees	10	

City & Guilds Level 3 90-Credit Diploma in Horticulture

To achieve the **Level 3 90-Credit Diploma in Horticulture**, learners are required to achieve 10 credits from the mandatory units in the table below. The remaining 80 credits can be made up of any combination of optional units (only 1 unit (10 credits) can be achieved from units 334 – 341). A total of 90 credits are required to achieve the qualification.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	Excluded combination of units (if any)
Mandatory units				
L6009149	301	Understand the Principles of Plant Science	5	
T6009579	351	Understand the Principles of Soil Science	5	
Optional units				
R6009394	302	Undertake and Review Work Experience in the Land-based Industries	10	
M6010021	303	Undertake an Investigative Project in the Land-Based Sector	10	
M6009709	304	Business Management in the Land-based Sector	10	
H6009805	305	Undertaking Land-based Machinery Operations	10	
Y6009610	307	Undertake Estate Skills	10	
R6009847	308	Manage Advanced Nursery Stock Production	10	
J6009974	309	Undertake Horticultural Production Techniques-Outdoors	10	
L6009975	310	Undertake Horticultural Production Techniques-Protected	10	
T6009842	312	Manage Plant Propagation Activities	10	
F6009844	313	Manage Soil Water	5	
L6009863	314	Understand the Principles of Plant Health and Protection	5	
D6009849	315	Understand the Principles of Organic Crop Production	10	
J6009943	317	Construct and Maintain Decorative Landscape Features	10	
T6009971	318	Establish and Manage Exterior Plant Displays	10	

F6009973	319	Establish and Manage Interior Plant Displays	10	
D6009981	320	Understand Historical Influences on the Development of Gardens	10	
H6009982	322	Undertake Identification, Selection and Use of Ornamental Plants	10	
M6009970	323	Maintain Turf in Parks and Gardens	10	
Y6009882	324	Undertake Site Surveying, Levelling and Setting Out	10	
A6009955	326	Construct Horizontal Landscape Surfaces	10	
H6009948	327	Construct and Maintain Timber Landscape Features	10	
D6009950	328	Construct and Restore Walls	10	
D6009883	329	Prepare Landscape and Garden Design Briefs	10	
K6009885	330	Understand the Principles and Practices of Landscape and Garden Design	10	
L6009846	331	Understand the Principles of Advanced Horticultural Science	10	
M6009922	332	Construct and Establish Sports and Amenity Turf Areas	10	
A6009907	333	Understand the Principles of Sustainable Management of Turf	5	
K6009840	334	Manage Amenity Turf	10	
Y6009848	335	Manage Sports Turf Surfaces – Bowling Greens	10	
D6009852	336	Manage Sports Turf Surfaces – Cricket	10	
R6009850	337	Manage Sports Turf Surfaces – Association Football	10	
H6009853	338	Manage Sports Turf Surfaces – Golf	10	
M6009855	339	Manage Sports Turf Surfaces – Horseracing	10	
A6009857	340	Manage Sports Turf Surfaces – Rugby Pitches	10	
F6009858	341	Manage Sports Turf Surfaces – Tennis	10	
J6009859	342	Manage Winter and Summer Sports Turf Surfaces	10	

M6009919	343	Undertake Computer Aided Design in Horticulture, Treework and Blacksmithing	10	
R6009962	344	Undertake Contract Management in Land-based Industries	10	
K6009921	346	Understand the Principles and Identify the Signs of Pests and Diseases of Trees	10	
F6009911	347	Undertake Tree and Shrub Pruning and Maintenance	10	
A6009843	348	Undertake Advanced Arboricultural Practices	10	
Y6009980	349	Understand and Carry Out Identification, Planting and Care of Trees	10	
R6009444	350	Understand the Principles and Carry Out the Practice of Wildlife Population Surveys, Ecology and Conservation	10	

City & Guilds Level 3 Diploma in Horticulture

To achieve the **Level 3 Diploma in Horticulture**, learners are required to achieve 40 credits from the mandatory units in the table below. The remaining 80 credits can be made up of any combination of optional units from the table below. A total of 120 credits are required to achieve the qualification.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	Excluded combination of units (if any)
Mandatory units				
L6009149	301	Understand the Principles of Plant Science	5	
T6009579	351	Understand the Principles of Soil Science	5	
R6009394	302	Undertake and Review Work Experience in the Land-based Industries	10	
M6010021	303	Undertake an Investigative Project in the Land-based Sector	10	
M6009709	304	Business Management in the Land-based Sector	10	
Optional units				
H6009805	305	Undertaking Land-based Machinery Operations	10	
Y6009610	307	Undertake Estate Skills	10	
R6009847	308	Manage Advanced Nursery Stock Production	10	
J6009974	309	Undertake Horticultural Production Techniques – Outdoors	10	
L6009975	310	Undertake Horticultural Production Techniques – Protected	10	
T6009842	312	Manage Plant Propagation Activities	10	
F6009844	313	Manage Soil Water	5	
L6009863	314	Understand the Principles of Plant Health and Protection	5	
D6009849	315	Understand the Principles of Organic Crop Production	10	
J6009943	317	Construct and Maintain Decorative Landscape Features	10	
T6009971	318	Establish and Manage Exterior Plant Displays	10	

F6009973	319	Establish and Manage Interior Plant Displays	10	
D6009981	320	Understand Historical Influences on the Development of Gardens	10	
H6009982	322	Undertake Identification, Selection and Use of Ornamental Plants	10	
M6009970	323	Maintain Turf in Parks and Gardens	10	
Y6009882	324	Undertake Site Surveying, Levelling and Setting Out	10	
A6009955	326	Construct Horizontal Landscape Surfaces	10	
H6009948	327	Construct and Maintain Timber Landscape Features	10	
D6009950	328	Construct and Restore Walls	10	
D6009883	329	Prepare Landscape and Garden Design Briefs	10	
K6009885	330	Understand the Principles and Practices of Landscape and Garden Design	10	
L6009846	331	Understand the Principles of Advanced Horticultural Science	10	
M6009922	332	Construct and Establish Sports and Amenity Turf Areas	10	
A6009907	333	Understand the Principles of Sustainable Management of Turf	5	
K6009840	334	Manage Amenity Turf	10	
Y6009848	335	Manage Sports Turf Surfaces – Bowling Greens	10	
D6009852	336	Manage Sports Turf Surfaces – Cricket	10	
R6009850	337	Manage Sports Turf Surfaces – Association Football	10	
H6009853	338	Manage Sports Turf Surfaces – Golf	10	
M6009855	339	Manage Sports Turf Surfaces – Horseracing	10	
A6009857	340	Manage Sports Turf Surfaces – Rugby Pitches	10	

F6009858	341	Manage Sports Turf Surfaces –Tennis	10	
J6009859	342	Manage Winter and Summer Sports Turf Surfaces	10	
M6009919	343	Undertake Computer Aided Design in Horticulture, Treework and Blacksmithing	10	
R6009962	344	Undertake Contract Management in Land-based Industries	10	
M6009841	345	Manage Heritage Gardens and Arboreta	10	
K6009921	346	Understand the Principles and Identify the Signs of Pests and Diseases of Trees	10	
F6009911	347	Undertake Tree and Shrub Pruning and Maintenance	10	
A6009843	348	Undertake Advanced Arboricultural Practices	10	
Y6009980	349	Understand and Carry Out Identification, Planting and Care of Trees	10	
R6009444	350	Understand the Principles and Carry Out the Practice of Wildlife Population Surveys, Ecology and Conservation	10	

City & Guilds Level 3 Extended Diploma in Horticulture

To achieve the **Level 3 Extended Diploma in Horticulture**, learners are required to achieve 50 credits from the mandatory units in the table below. The remaining 130 credits can be made up of any combination of optional units from the table below. A total of 180 credits are required to achieve the qualification.

Unit accreditation number	City & Guilds unit number	Unit title	Credit value	Excluded combination of units (if any)
Mandatory units				
L6009149	301	Understand the Principles of Plant Science	5	
T6009579	351	Understand the Principles of Soil Science	5	
R6009394	302	Undertake and Review Work Related Experience in the Land-based Industries	10	
M6010021	303	Undertake an Investigative Project in the Land-Based Sector	10	
M6009709	304	Business Management in the Land-based Sector	10	
H6009805	305	Undertaking Land-Based Machinery Operations	10	
Optional units				
F6009701	306	Participate in Business Planning and Improvement in the Land-based Sector	10	
Y6009610	307	Undertake Estate Skills	10	
R6009847	308	Manage Advanced Nursery Stock Production	10	
J6009974	309	Undertake Horticultural Production Techniques-Outdoors	10	
L6009975	310	Undertake Horticultural Production Techniques-Protected	10	
A6009812	311	Undertake Retail Merchandising for the Land-Based Sector	10	
T6009842	312	Manage Plant Propagation Activities	10	
F6009844	313	Manage Soil Water	5	
L6009863	314	Understand the Principles of Plant Health and Protection	5	

D6009849	315	Understand the Principles of Organic Crop Production	10	
R6009864	316	Understand the Principles of Sustainable Development	10	
J6009943	317	Construct and Maintain Decorative Landscape Features	10	
T6009971	318	Establish and Manage Exterior Plant Displays	10	
F6009973	319	Establish and Manage Interior Plant Displays	10	
D6009981	320	Understand Historical Influences on the Development of Gardens	10	
K6009949	321	Understand and Manage Landscape Restoration	10	
H6009982	322	Undertake Identification, Selection and Use of Ornamental Plants	10	
M6009970	323	Maintain Turf in Parks and Gardens	10	
Y6009882	324	Undertake Site Surveying, Levelling and Setting Out	10	
T6009887	325	Undertake Specification, Programming and Monitoring of Landscape Projects	10	
A6009955	326	Construct Horizontal Landscape Surfaces	10	
H6009948	327	Construct and Maintain Timber Landscape Features	10	
D6009950	328	Construct and Restore Walls	10	
D6009883	329	Prepare Landscape and Garden Design Briefs	10	
K6009885	330	Understand the Principles and Practices of Landscape and Garden Design	10	
L6009846	331	Understand the Principles of Advanced Horticultural Science	10	
M6009922	332	Construct and Establish Sports and Amenity Turf Areas	10	
A6009907	333	Understand the Principles of Sustainable Management of Turf	5	

K6009840	334	Manage Amenity Turf	10	
Y6009848	335	Manage Sports Turf Surfaces - Bowling Greens	10	
D6009852	336	Manage Sports Turf Surfaces – Cricket	10	
R6009850	337	Manage Sports Turf Surfaces – Association Football	10	
H6009853	338	Manage Sports Turf Surfaces – Golf	10	
M6009855	339	Manage Sports Turf Surfaces –Horseracing	10	
A6009857	340	Manage Sports Turf Surfaces –Rugby Pitches	10	
F6009858	341	Manage Sports Turf Surfaces –Tennis	10	
J6009859	342	Manage Winter and Summer Sports Turf Surfaces	10	
M6009919	343	Undertake Computer Aided Design in Horticulture, Treework and Blacksmithing	10	
R6009962	344	Undertake Contract Management in Land-Based Industries	10	
M6009841	345	Manage Heritage Gardens and Arboreta	10	
K6009921	346	Understand the Principles and Identify the Signs of Pests and Diseases of Trees	10	
F6009911	347	Undertake Tree and Shrub Pruning and Maintenance	10	
A6009843	348	Undertake Advanced Arboricultural Practices	10	
Y6009980	349	Understand and Carry Out Identification, Planting and Care of Trees	10	
R6009444	350	Understand the Principles and Carry Out the Practice of Wildlife Population Surveys, Ecology and Conservation	10	

1.2 Opportunities for progression

On completion of these qualifications learners may progress into employment or to the following City & Guilds qualifications:

- Level 4 and above centre-based qualifications in horticulture
- Level 3 or 4 qualifications in Work-based Horticulture
- Other related qualifications

1.3 Qualification support materials

City & Guilds also provides the following publications and resources specifically for these qualifications:

Description	How to access
Assignment guide	www.cityandguilds.com
Marking guide	information@cityandguilds.com
Information Sheets	www.cityandguilds.com
Fast Track approval forms/generic fast track approval form	www.cityandguilds.com

2 Centre requirements

This section outlines the approval processes for Centres to offer these qualifications and any resources that Centres will need in place to offer the qualifications including qualification-specific requirements for Centre staff.

Centres already offering the Level 3 ANC and ANDip Horticulture (0345-30-35) and (0345-36-41)

Centres approved to offer the Level 3 ANC Horticulture (0345-30-35) and Level 3 ANDip Horticulture (0345-36-41) may apply for approval for the new Level 3 Certificate, Subsidiary Diploma, Diploma and Extended Diploma in Horticulture (0078-03) using the **fast track approval form**, available from the City & Guilds website.

Centres may apply to offer the new qualifications using the fast track form

- providing there have been no changes to the way the qualifications are delivered, and
- if they meet all of the approval criteria specified in the fast track form guidance notes.

Fast track approval is available for 12 months from the launch of the qualification. After this time, the qualification is subject to the **standard** Qualification Approval Process. It is the centre's responsibility to check that fast track approval is still current at the time of application.

New centres must apply for centre and qualification approval. Further information on this process is available on the City & guilds website.

Existing City & Guilds centres that do not offer Level 3 Advanced National Certificate in Horticulture (0345-30-35) or Level 3 Advanced National Diploma in Horticulture (0345-36-41) will need to get specific qualification approval to run these qualifications (contact your City & Guilds Local Office).

2.1 Resource requirements

Human resources

Staff delivering these qualifications must be able to demonstrate that they meet the following occupational expertise requirements. They should:

- be technically competent in the areas for which they are delivering training and/or have experience of providing training. This knowledge must be at least to the same level as the training being delivered
- have recent relevant experience in the specific area they will be assessing
- be occupationally knowledgeable in the areas of horticulture for which they are delivering training. This knowledge must be at least to the same level as the training being delivered
- have credible experience of providing training.

Centre staff may undertake more than one role, e.g. tutor and assessor or internal verifier, but must never internally verify their own assessments.

Assessors and internal verifiers

The centre must provide Assessor personnel who must be occupationally competent in the industry either qualified to at least level 3 and/or have current experience of working in the industry at this level.

The centre must provide Internal Quality Assurance personnel who must be occupationally competent in the land-based sector either qualified to at least level 3 and/or have current experience of working in the industry at this level.

Assessors/Internal Quality Assurance personnel may hold relevant qualifications such as D32/33/34 or A1/V1 or TAQA however they are not a mandatory requirement for this qualification. They should have had formal training in assessment/IQA, which may be the qualifications above, or other training that allows the assessor to demonstrate competence in the practice of assessment/IQA. This training may be carried out in-house or with an external agency.

TAQA qualifications are considered very appropriate as Continuing Professional Development (CPD) or as best practice standards for new centre staff to work towards. **Continuing professional development (CPD)**

Centres are expected to support their staff in ensuring that their knowledge remains current of the occupational area and of best practice in delivery, mentoring, training, assessment and verification, and that it takes account of any national or legislative developments.

2.2 Learner entry requirements

There are no formal entry requirements for learners undertaking these qualifications. However, centres must ensure that learners have the potential and opportunity to gain the qualifications successfully.

As part of the assessment for the Level 3 Diploma qualifications that contain work experience as a mandatory unit, learners must have access to a work setting/placement.

Age restrictions

These qualifications have been approved/accredited for 16-18, 18+ and 19+ learners. However, there are no age limits attached to learners undertaking the qualification unless this is a legal requirement of the process or the environment.

3 Course design and delivery

3.1 Initial assessment and induction

Centres will need to make an initial assessment of each candidate prior to the start of their programme to ensure they are entered for an appropriate type and level of qualification.

The initial assessment should identify:

- any specific training needs the candidate has, and the support and guidance they may require when working towards their qualifications. This is sometimes referred to as diagnostic testing.
- any units the candidate has already completed, or credit they have accumulated which is relevant to the qualifications they are about to begin.

City & Guilds recommends that centres provide an induction programme to ensure the candidate fully understands the requirements of the qualifications they will work towards, their responsibilities as a candidate, and the responsibilities of the centre. It may be helpful to record the information on a learning contract.

3.2 Recommended delivery strategies

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

Centres may design course programmes of study in any way which:

- best meets the needs and capabilities of their learners
- satisfies the requirements of the qualifications.

When designing and delivering the course programme, centres might wish to incorporate other teaching and learning that is not assessed as part of the qualifications. This might include the following:

- Functional Skills
- Personal learning and thinking skills (PLTS)

Where applicable, this could involve enabling the candidate to access relevant qualifications covering these skills.

4 Assessment

4.1 Summary of assessment methods

For these qualifications, learners will be required to complete the following assessments:

- **one** assignment for **each** unit

City & Guilds provides the following assessments:

- Assignment Guide containing assignments for each unit.

Time constraints

The following time constraints must be applied to the assessment of these qualifications:

- All assignments must be completed and assessed within the candidate's period of registration. Centres should advise learners of any internal timescales for the completion and marking of individual assignments.

4.2 Assignments

The assignment guide for these qualifications is available to download from www.cityandguilds.com.

4.3 Recognition of prior learning (RPL)

Recognition of Prior Learning (RPL) recognises the contribution a person's previous experience could contribute to a qualification.

4.4 Resubmission of Assignments

Centres are advised to adopt the following policy on the re-submission of work:

Learners who fail an assignment on the formal (summative) submission, or who would like the opportunity to improve their grade, may re-submit once only and may then achieve either a Pass, Merit or Distinction as appropriate. An appropriate time period between formal submission and re-submission should be set by the centre. Multiple re-submissions are not permitted. Learners who fail to hand in work on the formal submission date, where there is no legitimate reason, should be capped to a maximum of a Pass grade only at the re-submission stage. It is at the discretion of the centre to set informal (formative) submission dates, if appropriate, and a formal submission date.

5 Units

Summary of units

City & Guilds unit number	Title	QCF unit number	Credits
301	Understand the Principles of Plant Science	L6009149	5
351	Understand the Principles of Soil Science	T6009579	5
302	Undertake and Review Work Related Experience in the Land-based Industries	R6009394	10
303	Undertake an Investigative Project in the Land-Based Sector	M6010021	10
304	Business Management in the Land-based Sector	M6009709	10
305	Undertaking Land-based Machinery Operations	H6009805	10
306	Participate in Business Planning and Improvement in the Land-based Sector	F6009701	10
307	Undertake Estate Skills	Y6009610	10
308	Manage Advanced Nursery Stock Production	R6009847	10
309	Undertake Horticultural Production Techniques – Outdoors	J6009974	10
310	Undertake Horticultural Production Techniques – Protected	L6009975	10
311	Undertake Retail Merchandising for the Land-Based Sector	A6009812	10
312	Manage Plant Propagation Activities	T6009842	10
313	Manage Soil Water	F6009844	5
314	Understand the Principles of Plant Health and Protection	L6009863	5
315	Understand the Principles of Organic Crop Production	D6009849	10
316	Understand the Principles of Sustainable Development	R6009864	10
317	Construct and Maintain Decorative Landscape Features	J6009943	10
318	Establish and Manage Exterior Plant Displays	T6009971	10
319	Establish and Manage Interior Plant Displays	F6009973	10
320	Understand Historical Influences on the Development of Gardens	D6009981	10
321	Understand and Manage Landscape Restoration	K6009949	10
322	Undertake Identification, Selection and Use of Ornamental Plants	H6009982	10

5 Units

323	Maintain Turf in Parks and Gardens	M6009970	10
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324	Undertake Site Surveying, Levelling and Setting Out	Y6009882	10
325	Undertake Specification, Programming and Monitoring of Landscape Projects	T6009887	10
326	Construct Horizontal Landscape Surfaces	A6009955	10
327	Construct and Maintain Timber Landscape Features	H6009948	10
328	Construct and Restore Walls	D6009950	10
329	Prepare Landscape and Garden Design Briefs	D6009883	10
330	Understand the Principles and Practices of Landscape and Garden Design	K6009885	10
331	Understand the Principles of Advanced Horticultural Science	L6009846	10
332	Construct and Establish Sports and Amenity Turf Areas	M6009922	10
333	Understand the Principles of Sustainable Management of Turf	A6009907	5
334	Manage Amenity Turf	K6009840	10
335	Manage Sports Turf Surfaces - Bowling Greens	Y6009848	10
336	Manage Sports Turf Surfaces - Cricket	D6009852	10
337	Manage Sports Turf Surfaces - Association Football	R6009850	10
338	Manage Sports Turf Surfaces - Golf	H6009853	10
339	Manage Sports Turf Surfaces - Horseracing	M6009855	10
340	Manage Sports Turf Surfaces - Rugby Pitches	A6009857	10
341	Manage Sports Turf Surfaces - Tennis	F6009858	10
342	Manage Winter and Summer Sports Turf Surfaces	J6009859	10
343	Undertake Computer Aided Design in Horticulture, Treework and Blacksmithing	M6009919	10
344	Undertake Contract Management in Land-Based Industries	R6009962	10
345	Manage Heritage Gardens and Arboreta	M6009841	10
346	Understand the Principles and Identify the Signs of Pests and Diseases of Trees	K6009921	10
347	Undertake Tree and Shrub Pruning and Maintenance	F6009911	10
348	Undertake Advanced Arboricultural Practices	A6009843	10

Trees

Y6009980

10

350	Understand the Principles and Carry Out the Practice of Wildlife Population Surveys, Ecology and Conservation	R6009444	10
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Certification/grading modules

City & Guilds unit number	Title
910	Certification module for Level 3 Certificate in Horticulture - pass grade
911	Certification module for Level 3 Certificate in Horticulture - merit grade
912	Certification module for Level 3 Certificate in Horticulture - distinction grade
913	Certification module for Level 3 Subsidiary Diploma in Horticulture - pass grade
914	Certification module for Level 3 Subsidiary Diploma in Horticulture - merit grade
915	Certification module for Level 3 Subsidiary Diploma in Horticulture - distinction grade
916	Certification module for Level 3 Diploma in Horticulture - pass grade
917	Certification module for Level 3 Diploma in Horticulture - merit grade
918	Certification module for Level 3 Diploma in Horticulture - distinction grade
919	Certification module for Level 3 Extended Diploma in Horticulture - pass grade
920	Certification module for Level 3 Extended Diploma in Horticulture - merit grade
921	Certification module for Level 3 Extended Diploma in Horticulture - distinction grade
949	Certification module for Level 3 Certificate in Horticulture – distinction* grade
950	Certification module for Level 3 Subsidiary Diploma in Horticulture – distinction* grade
951	Certification module for Level 3 Diploma in Horticulture – distinction* grade
952	Certification module for Level 3 Extended Diploma in Horticulture – distinction* grade
981	Certification module for Level 3 90-Credit Diploma in Horticulture – pass grade
982	Certification module for Level 3 90-Credit Diploma in Horticulture – merit grade
983	Certification module for Level 3 90-Credit Diploma in Horticulture – distinction grade
984	Certification module for Level 3 90-Credit Diploma in Horticulture – distinction* grade

6 Registration and certification

The Level 3 Certificate, Subsidiary Diploma, 90-Credit Diploma, Diploma and Extended Diploma in Horticulture qualifications have been grouped into one programme for registration.

Tutors and Examination Officers should ensure that learners are registered onto 0078-03 and that all 0078-03 documentation for teaching and administration with City & Guilds is used.

When learners' results are submitted to City & Guilds, centres should also submit the relevant Certificate, Subsidiary Diploma, Diploma and Extended Diploma component, according to which units the learner has achieved, so that the appropriate certificate is generated. The overall grade can be calculated using the formula in the assignment guide.

Please note: There are four certification/grading modules for each of the qualifications which differentiates the four grades – pass, merit, distinction and distinction*. Once the overall grade for the assignments has been calculated, the correct certification/grading module needs to be indicated on the results entry.

For example, if a learner achieves the Level 3 Certificate in Horticulture at an overall merit grade, then the certification module 911 needs to be submitted. Please see the Rules of Combination below or the City & Guilds catalogue.

Level 3 Certificate in Horticulture QAN 500/8402/1	
Rules for achievement of qualification	30 credits from 351, (309 – 310), 312, 315, (318 – 320), (322 – 324), (329 – 330), 332, 334, 342, (346 – 347), 349 Plus 910 for certification at pass grade

Level 3 Certificate in Horticulture QAN 500/8402/1	
Rules for achievement of qualification	30 credits from 351, (309 – 310), 312, 315, (318 – 320), (322 – 324), (329 – 330), 332, 334, 342, (346 – 347), 349 Plus 911 for certification at merit grade

Level 3 Certificate in Horticulture QAN 500/8402/1	
Rules for achievement of qualification	30 credits from 351, (309 – 310), 312, 315, (318 – 320), (322 – 324), (329 – 330), 332, 334, 342, (346 – 347), 349 Plus 912 for certification at distinction grade

Level 3 Certificate in Horticulture QAN 500/8402/1	
Rules for achievement of qualification	30 credits from 351, (309 – 310), 312, 315, (318 – 320), (322 – 324), (329 – 330), 332, 334, 342, (346 – 347), 349 Plus 949 for certification at distinction* grade

Level 3 Subsidiary Diploma in Horticulture QAN 500/8385/5	
Rules for achievement of qualification	10 credits from 301, 351 plus a minimum of 50 credits from (303 – 305, (308 – 310), (312 – 315), (318 – 320), (322 – 324), (326 – 332), 334, (only a maximum of 1 unit (10 credits) from 342 – 344), (346 – 349) Plus 913 for certification at pass grade

Level 3 Subsidiary Diploma in Horticulture QAN 500/8385/5	
Rules for achievement of qualification	10 credits from 301, 351 plus a minimum of 50 credits from (303 – 305, (308 – 310), (312 – 315), (318 – 320), (322 – 324), (326 – 332), 334, (only a maximum of 1 unit (10 credits) from 342 – 344), (346 – 349) Plus 914 for certification at merit grade

Level 3 Subsidiary Diploma in Horticulture QAN 500/8385/5	
Rules for achievement of qualification	10 credits from 301, 351 plus a minimum of 50 credits from (303 – 305, (308 – 310), (312 – 315), (318 – 320), (322 – 324), (326 – 332), 334, (only a maximum of 1 unit (10 credits) from 342 – 344), (346 – 349) Plus 915 for certification at distinction grade

Level 3 Subsidiary Diploma in Horticulture QAN 500/8385/5	
Rules for achievement of qualification	10 credits from 301, 351 plus a minimum of 50 credits from (303 – 305, (308 – 310), (312 – 315), (318 – 320), (322 – 324), (326 – 332), 334, (only a maximum of 1 unit (10 credits) from 342 – 344), (346 – 349) Plus 950 for certification at distinction* grade

Level 3 90-Credit Diploma in Horticulture QAN 600/6115/7	
Rules for achievement of qualification	10 credits from 301, 351 plus a minimum of 80 credits from (302 – 305), (307 – 310), (312 – 315), (317 – 320), (322 – 324), (326 – 344), (346 – 350), (only a maximum of 1 unit (10 credits) from 334 – 341) Plus 981 for certification at pass grade

Level 3 90-Credit Diploma in Horticulture QAN 600/6115/7	
Rules for achievement of qualification	10 credits from 301, 351 plus a minimum of 80 credits from (302 – 305), (307 – 310), (312 – 315), (317 – 320), (322 – 324), (326 – 344), (346 – 350), (only a maximum of 1 unit (10 credits) from 334 – 341) Plus 982 for certification at merit grade

Level 3 90-Credit Diploma in Horticulture QAN 600/6115/7	
Rules for achievement of qualification	10 credits from 301, 351 plus a minimum of 80 credits from (302 – 305), (307 – 310), (312 – 315), (317 – 320), (322 – 324), (326 – 344), (346 – 350), (only a maximum of 1 unit (10 credits) from 334 – 341) Plus 983 for certification at distinction grade

Level 3 90-Credit Diploma in Horticulture QAN 600/6115/7	
Rules for achievement of qualification	10 credits from 301, 351 plus a minimum of 80 credits from (302 – 305), (307 – 310), (312 – 315), (317 – 320), (322 – 324), (326 – 344), (346 – 350), (only a maximum of 1 unit (10 credits) from 334 – 341) Plus 984 for certification at distinction* grade

Level 3 Diploma in Horticulture QAN 500/8384/3	
Rules for achievement of qualification	40 credits from 301, 351, (302 - 304) plus a minimum of 80 credits from 305, (307 – 310), (312 – 315), (317 – 320), (322 – 324), (326 – 350) Plus 916 for certification at pass grade

Level 3 Diploma in Horticulture QAN 500/8384/3	
Rules for achievement of qualification	40 credits from 301, 351, (302 - 304) plus a minimum of 80 credits from 305, (307 – 310), (312 – 315), (317 – 320), (322 – 324), (326 – 350) Plus 917 for certification at merit grade

Level 3 Diploma in Horticulture QAN 500/8384/3	
Rules for achievement of qualification	40 credits from 301, 351, (302 - 304) plus a minimum of 80 credits from 305, (307 – 310), (312 – 315), (317 – 320), (322 – 324), (326 – 350) Plus 918 for certification at distinction grade

Level 3 Diploma in Horticulture QAN 500/8384/3	
Rules for achievement of qualification	40 credits from 301, 351, (302 - 304) plus a minimum of 80 credits from 305, (307 – 310), (312 – 315), (317 – 320), (322 – 324), (326 – 350) Plus 951 for certification at distinction* grade

Level 3 Extended Diploma in Horticulture QAN 500/8401/X	
Rules for achievement of qualification	50 credits from 301, 351, (302 - 305), plus a minimum of 130 credits from (306-350) Plus 919 for certification at pass grade

Level 3 Extended Diploma in Horticulture QAN 500/8401/X	
Rules for achievement of qualification	50 credits from 301, 351, (302 - 305), plus a minimum of 130 credits from (306-350) Plus 920 for certification at merit grade

Level 3 Extended Diploma in Horticulture QAN 500/8401/X	
Rules for achievement of qualification	50 credits from 301, 351, (302 - 305), plus a minimum of 130 credits from (306-350) Plus 921 for certification at distinction grade

Level 3 Extended Diploma in Horticulture QAN 500/8401/X	
Rules for achievement of qualification	50 credits from 301, 351, (302 - 305), plus a minimum of 130 credits from (306-350) Plus 952 for certification at distinction* grade

- Learners must be registered at the beginning of their course. Centres should submit registrations using Walled Garden or Form S (Registration), under scheme/complex 0078-03.
- When assignments have been successfully completed results should be submitted on Walled Garden or Form S (Results submission). One of the certification/grading modules 910 to 921 or 949 to 952 or 981 to 984 need to be submitted to generate the appropriate certificate and grade. Centres should note that results will not be processed by City & Guilds until verification records are complete
- Learners achieving one or more assessment components will receive a Certificate of Unit Credit listing the assessment components achieved. Learners achieving the number and combination of assessment components required to meet a defined Rule of Combination will, in addition, be issued with a certificate. Centres must submit a certification/grading component to allow this to happen.

Full details on the procedures for all City & Guilds qualifications registered and certificated through City & Guilds can be found on the City & Guilds on-line catalogue.

Unit 301

Understand the Principles of Plant Science

Level: 3

Credit value: 5

Unit aim

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

The learner will have developed an understanding of how plants grow and develop, through knowledge of their structure and physiology.

Learning outcomes

There are **three** learning outcomes to this unit. The learner will:

1. Understand the function of plant structures
2. Understand the main processes of plant physiology
3. Understand plant growth and development

Guided learning hours

It is recommended that **30** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

N/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 301

Understand the Principles of Plant Science

Outcome 1

Understand the function of plant structures

Assessment Criteria

The learner can:

1. Identify the **major internal** and **external structures** of plants
2. Explain the **function** of the major plant structures

Unit content

Major internal structures

Cell structure (cytoplasm, organelles), parenchyma, collenchyma, sclerenchyma, xylem tissue, phloem tissue, cambium, epidermis, guard cells, and stomata

Major external structures

Root, shoots, stem, leaves, buds, flower, fruit, and seed

Specialised internal and external structures, for example pericycle, endodermis, lenticels, cotyledons, stolons, rhizomes, storage organs

Function

Photosynthesis, reproduction, support, transport, anchorage, absorption, storage, defence, attraction, aeration, respiration, division

Unit 301

Understand the Principles of Plant Science

Outcome 2

Understand the main processes of plant physiology

Assessment Criteria

The learner can:

1. Explain the major **processes** of plant physiology
2. Identify the **factors** which can **limit** the rate **of photosynthesis**

Unit content

Processes

Photosynthesis: process (equation) for photosynthesis, function of chlorophyll, functionality of guard cells and stomata, factors needed for photosynthesis to occur (light, chlorophyll, carbon dioxide, water)

Respiration: definition of aerobic and anaerobic respiration, equation for aerobic respiration, structure and function of mitochondria, diffusion, compensation point, factors influencing the rate of respiration (temperature, water availability, seasonal growth)

Uptake, transport and loss of water and nutrients: osmosis, diffusion, plasmolysis, turgor, translocation, transpiration, factors influencing transpiration (temperature, humidity, air movement, water supply, light, stomata)

Limiting factors of photosynthesis

Temperature, carbon dioxide, leaf colour, light, water availability

Unit 301

Understand the Principles of Plant Science

Outcome 3

Understand plant growth and development

Assessment Criteria

The learner can:

1. Explain the **life cycle** of selected plants

Unit content

Life cycle

Life cycle types (ephemeral, annual, biennial, perennial), process and stages of germination, types of germination (epigeal, hypogeal), types of reproduction (sexual reproduction, for example flower structures, pollination and fertilisation, seed production, dispersal), (asexual reproduction, for example vegetative propagation, parthenogenesis), primary growth of shoots and roots (cell division, cell expansion, cell differentiation, apical meristems, lateral meristems)

Unit 301 Understand the Principles of Plant Science

Notes for guidance

On completion of this unit, the learner will have developed an understanding of how plants grow and develop, through knowledge of their structure and physiology. It will be important that delivery relates to plants that are vocationally relevant to the learners- e.g. production crops for agriculture. Laboratory based practicals could help learners to explore plant physiology and structure, and a series of visits to growing crops could help learners better understand plant growth and development. Learners are required to study a range of monocotyledon and dicotyledon plants for this unit.

Outcome 1 requires the learner to identify the main internal and external structures of both monocotyledon and dicotyledon types of plants and to explain the function of the main plant structures. The outcome is mainly theory based and can be delivered by formal lectures, discussion, internet research and directed study.

Outcome 1 and 2 are directly linked as outcome 2 identifies the need for learners to explain the major processes of plant physiology and identify factors affecting photosynthesis. Learners may find it useful to undertake practical sessions, habitat surveys or site visits to a range of habitats to learn more about plant physiology and factors affecting photosynthesis.

Outcome 3 requires the learner to explain the life cycle of plants which again can be linked into outcome 1 and 2 with careful planning. Learners should visit sites where plants can be studied at appropriate development stages i.e. at different times of the year. Formal lectures, directed study and research will be required to enhance the learners understanding of the complexities of plant physiology and life cycles. It is important that a risk assessment is carried out prior to any practical activity and that suitable Personal Protective Equipment (PPE) is provided.

Visiting speakers e.g. agronomist, rangers or plant breeders could enhance relevance of the subject to learners. Work experience may be beneficial to learners looking to develop careers in the field. Development of areas within a College environment where learners are able to modify and manipulate plant environments may enhance understanding of the complexities of plants and their life cycles

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Unit 351

Understand the Principles of Soil Science

Level: 3

Credit value: 5

Unit aim

This unit aims to provide learners with an understanding of the principles of soil science. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

This unit aims to develop the learners understanding of soil characteristics, and their relationship to crop growth and development.

Learning outcomes

There are **three** learning outcomes to this unit. The learner will:

1. Be able to investigate soil characteristics
2. Understand how soil characteristics affect plant growth and development
3. Understand how soil characteristics affect plant selection

Guided learning hours

It is recommended that **30** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 351

Understand the Principles of Soil Science

Outcome 1

Be able to investigate soil characteristics

Assessment Criteria

The learner can:

1. Compare the **characteristics** of different **soil types**
2. Carry out **experiments** to determine the characteristics of a soil sample

Range

Soil types

Loams, clays, silts, sands, organic soils

Unit content

Characteristics

Properties of soil particles (clay, silt, sand), water holding capacity, aeration, stability, organic matter, pH, soil structure (crumb structure, aggregate sizes)

Experiments

Laboratory based tests (water holding capacity, soil pH, proportion of clay, silt and sand, nutrient content)

Unit 351

Understand the Principles of Soil Science

Outcome 2

Understand how soil characteristics affect plant growth and development

Assessment Criteria

The learner can:

1. Explain how **soil type and condition** affect plant growth and development
2. Explain how **soil structure and drainage** can **affect plant growth and development**.

Range

Soil types

Loams, clays, silts, sands, organic soils

Unit content

Soil condition

Stability, availability of macronutrients (nitrogen, phosphorous, potassium), micronutrients (for example iron, copper, manganese), nutrient retention, water retention and availability, effects of organic and inorganic fertiliser application, pH and organic matter

Effects of soil structure and drainage on plant growth and development

Rooting depth, availability of plant nutrients, drainage, water logging, compaction, effects of high soil water content (reduced oxygen availability, poor plant growth), effects of water availability to plants, effects on ability to cultivate

Unit 351

Understand the Principles of Soil Science

Outcome 3

Understand how soil characteristics affect plant selection

Assessment Criteria

The learner can:

1. Explain how **cultural techniques** affect **soil characteristics**

Range

Soil types

Loams, clays, silts, sands, organic soils

Unit content

Cultural techniques

Crop/plant rotations and crop/plant choice, nitrogen fixation

Cultivations: ploughing, minimal cultivation techniques, zero cultivation, subsoiling

Establishment: broadcasting, transplanting, precision seeding, direct drilling, use of green manures and muck inclusion

Crop maintenance: spraying and fertiliser application, damage by machine and its reduction

Harvesting and seasonality: harvesting damage

Soil characteristics

Proportions of sand, silt, clay, organic matter content, water holding capacity, air, permeability, pH, porosity

Plant life and earth worm populations

Compaction capping and smearing

Unit 351 Understand the Principles of Soil Science

Notes for guidance

This unit aims to provide learners with an understanding of the interrelationship between soil characteristics and crop growth and development, and explores soil characteristics through investigative experiments. As learners will be engaged in practical activity there should be an emphasis on safe working practices, including the use of appropriate Personal Protective Equipment (PPE), and appropriate risk assessments should be undertaken. At Level 3 it is expected that learners will take an active part in completing risk assessments, so that this becomes an integral part of all practical activity.

Delivery of this unit will involve classroom based activity, laboratory experiments and visits to sites with different soil characteristics, preferably also with a range of crop types. It is likely that learners will also need to undertake independent study and research.

In Outcome 1, learners will need to investigate a range of soil types and carry out supervised basic soil experiments to identify different soil characteristics. These could include investigating the proportion of sand, silt and clay through suspending in water, investigating the water holding capacity of different soil types, and determining soil pH.

For Outcome 2, learners will need to develop an understanding of the effects of soil characteristics on crop growth and development. This could be supported by some controlled experiments, where learners grow plants in different soil types. Delivery of this outcome could also be enhanced by visits to see different types of crops growing in different soil types. Visiting expert speakers, such as soil scientists or agronomists, could be useful, and could describe practical aspects of managing soil structure and plant nutrition.

Outcome 3 covers the effect that choice of crop has on soil characteristics, which is the basis of crop rotation principles. Delivery will include consideration of the range of consequential effects of crop choice i.e. methods of planting and harvesting, use of machinery, crop requirement for supplementary nutrients. Delivery is likely to include both classroom activity and site visits, and could be linked to learners' work placements. A guest speaker, particularly one able to discuss the relative merits of crop rotation, would add further vocational interest.

References

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Websites

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www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.wales.gov.uk	Welsh Assembly Government
www.scotland.gov.uk	Scottish Executive Environment and Rural Affairs Department
www.dardni.gov.uk	Department of Agriculture and Rural Affairs (Northern Ireland)
www.hse.gov.uk	Health and Safety Executive
www.lantra.co.uk	Lantra SSC
www.pda.org.uk	Potash Development Association
www.rothamsted.ac.uk	Rothamsted Research
www-saps.plantsci.cam.ac.uk	The Science and Plants for Schools Website
www.soils.org.uk	British Society of Soil Science

Unit 302

Undertake and Review Work Related Experience in the Land-based Industries

Level: 3

Credit value: 10

Unit aim:

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

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Understand the opportunities in the environmental and land-based industries
2. Be able to prepare for a work-based experience in the environmental and land-based industry
3. Be able to undertake a work-based experience in the environmental and land-based industry
4. Be able to review a work-based experience in the environmental and land-based sector

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a.

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 302

Undertake and Review Work Related Experience in the Land-based Industries

Outcome 1

Understand the opportunities in the environmental and land-based industries

Assessment Criteria

The learner can:

1. Evaluate **career and progression opportunities** within an environmental and land-based industry

Unit content

Career and progression opportunities

Job roles relevant to the sector: managerial, supervisory, team worker, trainee, volunteer, common job titles within the relevant sector, main duties and responsibilities

Skills needed to fulfil duties and responsibilities of appropriate jobs: job specific, vocational and personal

Progression pathways from trainee or team worker positions to supervisory and management posts. Skills, qualifications and experience required to achieve career progression

Evaluate career and progression opportunities: advantages and disadvantages of identified pathways, suitability to personal interests, skills and qualifications, role of work experience in preparing for a selected career

Unit 302

Undertake and Review Work Related Experience in the Land-based Industries

Outcome 2

Be able to prepare for a work-based experience in the environmental and land-based industry

Assessment Criteria

The learner can:

1. **Select** an appropriate work-based experience and complete the **application process**
2. Demonstrate **interview skills** as an interviewee
3. Prepare for a work-based experience, identifying **targets, aims and objectives**

Unit content

Select

Suitable work experience position based on existing skills, experience, qualifications, development of skills and experience to achieve future employment goals

Application process

Finding suitable job opportunities from e.g. trade magazines, websites, employer approaches to the centre, completion of an application form, curriculum vitae and letter of application

Interview skills

Interview preparation: Research the business and job role, suitable dress and personal presentation, information to find out and suitable questions to ask. Interview performance: attend punctually and dressed appropriately, answering questions, completion of other tests (e.g. practical, aptitude), and reflection on interview performance

Targets, aims and objectives

Aims: overall impact of work experience on skills, experience, future employability, targets / objectives, specific development of workplace skills and knowledge (e.g. technical, vocational, business, team working, communication and employability)

Unit 302

Undertake and Review Work Related Experience in the Land-based Industries

Outcome 3

Be able to undertake a work-based experience in the environmental and land-based industry

Assessment Criteria

The learner can:

1. **Undertake** a selected appropriate work-based experience
2. Maintain a **record of activities and achievements** during a work-based experience.

Unit content

Undertake

Completion of 300 hours of appropriate work experience, attend punctually and reliably, work competently and in line with job role requirements, health and safety, security, confidentiality, effective working relationships with colleagues, supervisors and customers.

Record of activities and achievements

Job description for work role, main duties and responsibilities, regular daily working routine, diary of additional tasks, duties, learning experiences portfolio of work experience (e.g. photographs, witness statements, work experience provider's or assessor's reports, progress reviews)

Unit 302

Undertake and Review Work Related Experience in the Land-based Industries

Outcome 4

Be able to review a work- based experience in the environmental and land-based sector

Assessment Criteria

The learner can:

1. **Present evidence** of activities and achievements during a work-based experience
2. **Review** a work-based experience, identifying strengths and areas for improvement

Unit content

Present evidence

Name of work experience provider, nature of the organisation (type of business, products or services, customers), organisation structure chart, job description for work role, main duties and responsibilities, regular daily working routine, health, safety and welfare of employees, customers, animals, diary of additional tasks, duties, learning experiences, portfolio of work experience (e.g. photographs, witness statements, work experience provider's or assessor's reports and progress reviews)

Review

Business effectiveness: products and services, physical resources (e.g. buildings, machinery, equipment), business procedures, staff management and supervision, employees' skills and development, marketing and customer relations, personal workplace effectiveness: work speed, work quality, punctuality, attendance, reliability, dress and personal presentation, working relationships with peers, working relationships with supervisor, work experience aims, objectives and targets, impact of work experience on future career ambitions

Unit 302 Undertake and Review Work Related Experience in the Land-based Industries

Notes for guidance

Learners on vocational courses should have experience of the type of work that they hope to do, and of the expectations of potential future employers. Many Level 3 learners are likely to have already had experience of working in the land-based and environmental industries, so this unit seeks to provide new experience opportunities for these learners.

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

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

Learners should complete the equivalent of 8 weeks (or 300 hours) work experience to achieve this unit. If work experience is in the industry, centres should be mindful of their responsibilities for ensuring that work placements have appropriate supervision, insurance and health and safety policies in place.

In Outcome 1, learners will explore the different job roles and responsibilities, and the job titles commonly associated with them in their specialist sector. This background understanding is likely to require some formal classroom teaching, and may be closely linked to material in the unit "Business Management". Learners should be encouraged to explore the range of employment opportunities and career paths within their specialist sector. It would be appropriate for employers to be invited to outline to learners their expectations in the workplace. Learners will then consider the skills and qualifications that are required for appropriate jobs for themselves and should be encouraged to think about skills and qualifications that they may need to acquire to achieve their employment and careers ambitions. Evaluation of career and progression opportunities should include advantages and disadvantages of at least 3 possible career pathways within their specialist sector. This should help them to identify suitable work experience.

Outcome 2 involves learners going through the process of applying for work experience. They will need to locate suitable job adverts or work experience opportunities, but can be supported by centres suggesting suitable placements. When applying for work experience learners should produce, as a minimum, a detailed curriculum vitae and letter of application using a computer. Learners may need to be given supported workshop time on computers to develop these documents. Before attending for a work experience interview it would be appropriate for learners to role play an interview and be given feedback on their interview technique. After attending for an interview they should reflect on their performance and how they could improve their effectiveness. Before commencing work experience they should set overall aims to be achieved during the period and SMART (specific, measurable, achievable, realistic, timescaled) targets or objectives for learning and improvement in relation to future career aims.

Outcome 3 requires that learners effectively complete their period of work experience, meeting the requirements of the workplace appropriate for their position. It would be advisable for their progress to be reviewed at least once during the period and they should have access to tutor support in case of difficulties arising. During their work placement learners must produce the details of their job role and working routine, maintain a diary at least weekly, and collate other relevant information on their work placement, performance

and achievements. It would be appropriate for tutors to complete a report in consultation with the work experience provider mid-way and at the end of the placement.

In Outcome 4, learners will use evidence from outcome 3 to present a report, oral and/or written, on their work experience business, job role, learning and achievements. They will then review the effectiveness of the workplace, making realistic and justified suggestions for improvement. Review of their own workplace performance and achievements should include all of the content identified, with reference to relevant evidence, e.g. reports, progress reviews, and the extent to which their aims, objectives/targets have been achieved. Learners should consider further training and experience that will help them to achieve their career ambitions.

Unit 303

Undertake an Investigative Project in the Land-based Sector

Level: 3

Credit value: 10

Unit aim

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

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

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to identify and research a suitable topic for an investigative project in the environmental and land-based sector
2. Be able to plan for an investigative project in the environmental and land-based sector
3. Be able to carry out an investigative project in the environmental and land-based sector
4. Be able to report on an investigative project in the environmental and land-based sector

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 303

Undertake an Investigative Project in the Land-based Sector

Outcome 1

Be able to identify and research a suitable topic for an investigative project in the environmental and land-based sector

Assessment Criteria

The learner can:

1. List **information sources** relevant to the topic to be researched
2. Carry out **research** into potential topics
3. **Select and describe** a relevant investigative project topic in the environmental and land-based sector
4. **Prepare a proposal** for an investigative project

Range

The topics for the investigative project should reflect both learner interest and the qualification undertaken.

Unit content

Information sources

For example textbooks, journals, magazines, internet, trade literature, television and radio, subject experts, validity and reliability

Research

Methods appropriate to the project, e.g. literature review, trials, experiments, practical activities, questionnaires, interviews, surveys

Select and describe

Suitable project topic (e.g. trial or experiment, investigation of an issue important to the sector, preparation of a plan, production of a structure or artefact, training programme, preparation for and participation in a competition, improving a process, investigation of a new product or service). Justify the selection of the project topic in relation to e.g. programme of study, interests and experience, future employment ambitions, comparison with alternative topics

Prepare a proposal

Title, aims/ objectives, methodology, information sources, resources (e.g. people, computers, materials, etc. required for completion of the project), justification of proposed project

Unit 303

Undertake an Investigative Project in the Land-based Sector

Outcome 2

Be able to plan for an investigative project in the environmental and land-based sector

Assessment Criteria

The learner can:

1. **Plan operations and resources** required to carry out a selected investigative project in the environmental and land-based sector
2. Explain the **reasons** for resources selected

Range

The topics for the investigative project should reflect both learner interest and the qualification undertaken.

Unit content

Plan operations

Project planning techniques (e.g. critical path analysis, Gantt charts), sequencing of activities, working to deadlines, allowing for other commitments, project action plan: aims, objectives, specific operations / tasks, start and completion dates, time required, resources required, possible disruptions to plan (e.g. illness, other commitments, resource problems, IT problems, research problems, lack of cooperation, cost), contingencies and remedial actions

Resources

People, time, buildings, equipment, animals, materials, literature and media (internet, trade magazine), IT applications and budget

Reasons

Suitability, availability and cost

Unit 303

Undertake an Investigative Project in the Land-based Sector

Outcome 3

Be able to carry out an investigative project in the environmental and land-based sector

Assessment Criteria

The learner can:

1. **Carry out a selected investigative project** in the environmental and land-based sector
2. **Monitor progress**, working to **deadlines**
3. Discuss the **health and safety implications** of the investigative project

Range

The topics for the investigative project should reflect both learner interest and the qualification undertaken.

Unit content

Carry out a selected investigative project

Suitable project as proposed in outcome 1 (trial or experiment, investigation of an issue important to the sector, preparation of a plan, production of a structure or artefact, training programme, preparation for and participation in a competition, improving a process, investigation of a new product or service). Implementation (set up, start), operations (tasks, duties), evidence of actions e.g. literature review, artefacts, plans, presentations, witness statements, photographs or videos

Monitor progress

Diary or log of actions, monitoring of performance against schedule plan e.g. daily, weekly, monthly progress, budget, other appropriate measures for each resource or task, reasons and remedial actions if falling behind schedule

Deadlines

Interim, key mileposts, final, all to be reviewed at regular intervals by tutor

Health and safety implications

Health and safety, risk assessment, Personal Protective Equipment (PPE), relevant regulations and legislation, animal welfare, codes of practice

Unit 303

Undertake an Investigative Project in the Land-based Sector

Outcome 4

Be able to report on an investigative project in the environmental and land-based sector

Assessment Criteria

The learner can:

1. **Report** on a selected investigative project in the environmental and land-based sector
2. **Evaluate achievements and areas for improvement** of a selected investigative project

Range

The topics for the investigative project should reflect both learner interest and the qualification undertaken.

Unit content

Report

Report on the project selected and completed in outcomes 1-3. Written report format, oral report presentation, title, aims/objectives, review of existing literature/information, methodology, results/findings (with appropriate evidence, e.g. charts and graphs, diagrams, photographs), conclusions, Harvard referencing

Evaluate achievements

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

Areas for improvement

Planning, implementation, methodology, results/findings, report, topics for further investigation

Unit 303

Undertake an Investigative Project in the Land-based Sector

Notes for guidance

This unit is designed to encourage and develop independent research skills in learners provides valuable skills development for all level 3 learners and especially those looking to progress onto Higher Education. The concept of the project is applicable across all of the vocational areas in the environmental and land-based sector, and learners should be guided and encouraged to select a project topic that is particularly relevant to their interests. This could integrate with other units in their programme of study. The emphasis of the unit should be on project management and working to deadlines, as well as producing a meaningful investigative project. Much of the work will be carried out independently by learners but they must have access to appropriate tutor guidance and support.

In Outcome 1, learners will need to identify a suitable topic for their investigative project. This should be relevant to their programme of study and have a particular interest for them, for example in relation to a special area of interest, experience or future employment of study ambitions. Ideal project topics could have a practical or theoretical focus, but all projects should include potential for research into existing literature and information sources as well as a practical investigation or application, so should be chosen in agreement with the tutor. Learners are likely to need guidance on suitable project topics and tutor support to ensure that selected topics are achievable in the timescale and with the resources available. The proposal should outline the aims and objectives, information sources, resource requirements, and the methodology by which the learner intends to complete the project, as well as their justification for topic selection. If appropriate to the investigation, a hypothesis should be included as part of the methodology.

In Outcome 2, learners will need to complete a detailed action plan for completion of the investigative project within the set timescale. This should include, as a minimum:

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

They should also consider possible setbacks to their planned schedule and contingency plans to ensure timely completion of the project. Learners are likely to require guidance on project planning techniques and how to compile an appropriately detailed action plan. They could be provided with a suitable template.

In Outcome 3, learners will conduct and complete their investigative project, collecting supporting evidence as appropriate, for example literature review, artefacts, witness statements, photographs or videos, etc. Whilst doing this, they should maintain a log or diary of all actions, and regularly monitor their progress against their action plan. It would be appropriate for tutors to conduct progress reviews at key stages of the project. As part of conducting the project, learners should discuss any health and safety implications of their work to humans and, if appropriate, animals, and identify any relevant legislation or codes of practice. Risk assessments may contribute to evidence of this.

In Outcome 4, learners will produce a summary report of their project and the process of its completion. This should cover, as a minimum:

- title
- aims / objectives
- review of existing literature / information
- methodology
- results / findings
- conclusions
- references

All referencing should comply with academic conventions, and learners should be given appropriate guidance on this.

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

Some parts of the project report could be presented orally rather than in written report format.

References

Books

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Nokes, S., Kelly, S. 2007. *The Definitive Guide to Project Management: The Fast Track to Getting the Job Done on Time and on Budget*. 2nd ed. Harlow: Financial Times Prentice Hall.

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Unit 304

Business Management in the Land-based Sector

Level: 3

Credit value: 10

Unit aim

The learner will look at the business, the role and responsibilities of those employed in land-based businesses and resource requirements. They will develop their skills in business operations and produce a business plan.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

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

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 304

Business Management in the Land-based Sector

Outcome 1

Know the breadth and importance of an industry in the environmental and land-based sector

Assessment Criteria

The learner can:

1. Describe the **importance** of businesses within the industry **to the economy**
2. Outline the range of **associated businesses** allied to the industry

Unit content

Importance to the economy

Using measures available to the industry, e.g. value of output, contribution to Gross Domestic Product (GDP), employment, land use, economic and social benefits, trends in importance

Range of organisations: typical types of businesses and other organisations (e.g. representative, regulatory, not-for-profit) within the sector, regional variations, changes and developments in the last 50 years

Associated businesses

Relevant industries in primary, secondary and tertiary industrial sectors (e.g. suppliers of raw materials, processors, distributors, retailers, service providers)

Associated organisations: specific interrelationships between one business and other associated organisations e.g. suppliers of goods and services, representative organisations and professional bodies, regulatory bodies, competitors, customers, aims and roles of important organisations in the sector

Unit 304

Business Management in the Land-based Sector

Outcome 2

Understand business resources and structures

Assessment Criteria

The learner can:

1. Explain the **legal structure and organisation** of a land-based business
2. Explain the **physical resource requirements** of a selected land-based business
3. Describe different **job roles and responsibilities** in a selected land-based business

Unit content

Legal structure and organisation

Features of the main business types, e.g. sole trader, partnership, limited company, not-for-profit organization, charity, public sector organisations, organization staffing structure

Physical resource requirements

Property (forms of tenure, appraisal of business potential), vehicles and machinery, tools and equipment, stocks (stock control procedures), insurance of physical resources

Job roles and responsibilities

Job roles relevant to the sector, e.g. director, manager, supervisor, team worker, trainee, administrator, volunteer, sub contractor, job title, job description, responsibilities for financial, physical and human resources, staff motivation and performance management, person specification (typical skills, qualifications and experience required to fulfil the role), legal rights and responsibilities in work (e.g. pay, working hours, holidays, equal opportunities, health and safety, employment protection), relevant employment legislation

Unit 304 **Business Management in the Land-based Sector**

Outcome 3 Understand the business marketplace

Assessment Criteria

The learner can:

1. Describe the **marketplace, customers and competitors** for a land-based business
2. Explain features of an efficient **supply chain** in a land-based context
3. Review **quality management** systems and practices within a land-based business

Unit content

Marketplace, customers and competitors

Size of market (e.g. value of sales, number of customers), external influences on the market (political, economic, socio-cultural, technological), customer base (number, type, characteristics, market segments), direct and indirect competitors, competitor analysis, market share

Supply chain

Suppliers, distributors, customers, choosing suppliers, ensuring supplies of inputs, supply chain assurance (e.g. environmental, animal welfare)

Quality management

Important aspects of quality in the sector, formal quality standards or approval (e.g. Farm Assured, ISO 9000, BHS approval), informal systems and practices to achieve quality, problems arising if quality is not achieved

Unit 304

Business Management in the Land-based Sector

Outcome 4

Understand how to use financial and physical record keeping systems

Assessment Criteria

The learner can:

1. Review **financial records** for a selected land-based business
2. Examine **physical records** for a selected land-based business
3. Examine the use of financial and physical records in **monitoring business performance and progress**

Unit content

Financial records

Importance of keeping accurate records (legal requirements and management efficiency), purchasing and ordering procedures, order forms and orders, deliveries and receipts, invoices and sales records, credit control, payment methods, bookkeeping (cash analysis, petty cash, cash flow, budgets, computer accounts programmes), basic accounts (trading account, balance sheet, depreciation), taxation (VAT, income tax PAYE, national insurance contributions, corporation tax), wage calculation

Physical records

Records appropriate to the industry relating to e.g. production, inputs, staffing, customers, resource use, data protection, legal requirements to keep records, e.g. pesticide use, veterinary medicines, transport, animal movement, passports

Monitor business performance and progress

Use of financial and physical records to monitor business performance, e.g. production levels, costs of production, financial efficiency, monitoring against targets, budgets, previous periods, relevant review periods (e.g. weekly, monthly, annually), appropriate remedial actions, staff roles in recording and analysing information

Unit 304 Business Management in the Land-based Sector

Notes for guidance

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

In Outcome 1 they will investigate the size, scope and importance of their specialist sector within the environment and land-based industries, and how this has developed over the last 50 years or so. For some sectors this type of information is more readily available than other (e.g. agriculture), so learners should be supported in accessing whatever information is available relevant to their sector. They will also investigate the range of business types and other organisations that are represented in their sector, including important regulatory, professional or representative organisations. Wherever possible this should be related to specific businesses and organisations. This outcome is likely to require formal teaching, which should be supported by relevant information on businesses and organisations within the sector, and could include speakers representing these. Independent study and investigation should also be encouraged.

Outcome 2 focuses on the legal and resource implications of constituting a business. They will learn about the range of business organisations in the private and public sectors, and the legal and practical implications of different business types. This should be related to the types of business important in their sector. Learners will investigate the physical resource requirements of businesses, and how they are managed. It would be appropriate for learners to undertake a case study on a business premises in their sector and appraise its strengths and weaknesses for a given business use. The understanding that learners will gain on job roles and responsibilities has links with the requirements for Work Experience, and employers could be invited to explain their expectations in the workplace. The learners' investigations should focus on job roles within their specialist sector.

In Outcome 3 learners will analyse the market for a specific land-based business. This could involve a case study project and should identify, for that business, information on the content listed. External influences should be relevant and current to that business. Specific competitors should be identified and analysed to identify strengths and weaknesses to the case study business. When investigating the supply chain learners will need to identify the flow of resources from production of raw materials, through relevant manufacture and processing, to end consumers. Quality management will include reference to any formal standards or approvals that are relevant. It should also consider the quality standards required by the industry, any systems and practices that are used to achieve quality, and implications of failing to meet prescribed or assumed levels of quality. This should be related to specific businesses and teaching could again be supported by relevant visiting speakers from industry.

Outcome 4 focuses on the range of financial and physical records that are required to meet legal requirements as well as to ensure effective business operation. Learners will need to be able to complete simple examples of the range of financial records listed. They should be aware of paper-based and computerised systems for financial records but are not expected to become competent in the use of IT accounts software. The range of physical records investigated should be related to the needs of the learners' specialist sector, and should include important current examples of legally required records. This content could link with other specialist vocational units. In addition to completing a range of records, learners will investigate how specific examples can be used to aid decision making, monitor and control business performance.

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

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

References

Books

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Unit 305

Undertaking Land-based Machinery Operations

Level: 3

Credit value: 10

Unit aim

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

The learners will study the purpose and operation of land-based machines including machine layout, systems and controls. They will explore daily checks and adjustments as well as appropriate Personal Protective Equipment and the legal and recommended requirements for land-based machinery. They will learn how to safely operate and maintain machinery and consider the different conditions in which machinery might need to operate.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Understand the purpose and operation of land-based machines
2. Be able to prepare land-based machines ready for work
3. Be able to safely operate land-based machinery
4. Be able to carry out operator maintenance and simple repairs

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

CU28 Prepare for and maintain equipment and machines

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 305

Undertaking Land-based Machinery Operations

Outcome 1

Understand the purpose and operation of land-based machines

Assessment Criteria

The learner can:

1. Explain the purpose and **safe operation** of selected land-based machines
2. Discuss the **differences between selected land-based machines**

Range

A range of modern land-based machines designed for the production of a seedbed, cutting or handling of grass swaths, application of materials, harvesting of crop

Unit content

Safe operation

Need for operator training, certification process, Health and safety at Work etc Act 1974, Provision and Use of Work Equipment Regulations 1998 (PUWER), Environment Act 1995, Control of Substances Hazardous to Health 2002 (COSHH), Personal Protective Equipment (PPE), manual handling, risk assessments, codes of practice

Differences between Land-based machines

Trailed or mounted, powered or non powered, mechanical, electric or hydraulic powered, wheels, skids or hydraulic pressure accumulation, cutting, gathering, conveying; belts, chains, shaft drives; vacuum, pressure, gravity; swath width, bout width, row width, depth control

Unit 305

Undertaking Land-based Machinery Operations

Outcome 2

Be able to prepare land-based machines ready for work

Assessment Criteria

The learner can:

1. **Prepare selected land-based machinery** ready for work safely
2. Review the **pre-start checks** and **safety requirements** for selected land-based machinery

Range

A range of modern land-based machines designed for the production of a seedbed, cutting or handling of grass swaths, application of materials, harvesting of crop

Unit content

Prepare selected land-based machines

Power unit suitability, removal from storage, cleaning, damage inspection, correct hitching, free movement of working components/controls, connection to power unit, wheel and tyre maintenance, braking and lighting requirements, lubrication, calibration, tying/wrapping materials, initial field settings

Pre-start checks

Power drive shaft condition, decontaminated, safety overload devices, fuel/oil requirements, tyre pressures and conditions, lighting controls including brakes, belt tensions

Safety requirements

Guards, safety rails, steps, safe attachment to power unit, component security, information decals

Unit 305

Undertaking Land-based Machinery Operations

Outcome 3

Be able to safely operate land-based machinery

Assessment Criteria

The learner can:

1. **Operate** selected land-based machinery to meet given objectives safely
2. Explain the **safe operation** of selected land-based machinery

Range

A range of modern land-based machines designed for the production of a seedbed, cutting or handling of grass swaths, application of materials, harvesting of crop

Unit content

Operate

Site risk assessments, PPE, operator instruction manual, data sheets, transport/field settings, calibration check, correct power engagement, correct machine speeds, safe/correct loading of materials, machine output checks/quality of work, field procedures, terrain, ground conditions/undulations, public access

Safe operation

Health and Safety at Work etc Act (1974), follow manufacturers' recommendations, dealer installation process, operator instruction manuals, manufacturer web sites

Unit 305

Undertaking Land-based Machinery Operations

Outcome 4

Be able to carry out operator maintenance and simple repairs

Assessment Criteria

The learner can:

1. Carry out **operator maintenance** and appropriate **repairs** for selected land-based machinery
2. Assess **potential faults** and/or **defective parts** on a given land-based machine

Range

A range of modern land-based machines designed for the production of a seedbed, cutting or handling of grass swaths, application of materials, harvesting of crop

Unit content

Operator maintenance

Manufacturers' service schedules/instructions, lubrication, cleaning, assessment of wear tolerances, component replacement disposal of waste

Repairs

Framework welds, joints, distortion, fractures, leaking pipes, connections

Potential faults

Uneven groundwork, crop damage, inaccurate outputs, incorrect linkage settings, incorrect drawbar settings, uneven tyre pressures, incorrect track widths, power unit unsuitable, blockages

Defective parts

Belts, chains, bearings, loose splines, shares/tines, blunt/missing knives, rotor balance, nozzles/filters, and seals

Unit 305 Undertaking Land-based Machinery Operations

Notes for guidance

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

Learners will be able to demonstrate pre start checks, initial settings and safe start up techniques for a range of selected machines prior to connecting the machine to a suitable power unit and preparing machine and power unit for work. An emphasis will be put on the correct use of manufacturers' recommended procedures and respect for health and safety issues and conformation of relevant safe working practices.

It is envisaged that all learners, prior to studying this unit will have received training in the use of tractors and have been assessed as having reached a level of competence to allow practical tasks to be demonstrated safely. Learners must show awareness and consideration of hazards and risks at all times, particularly during fieldwork situations where levels of risk may vary at any given time.

Where possible, non-simulated field work should be programmed into the learning period to take into account seasonal opportunities. Following field operations, learners will demonstrate simple maintenance and pre storage tasks to minimise degeneration of the machine and to ensure the machine is in a useable condition for subsequent operations.

The range of machinery covered should include electric vehicles and machines if appropriate.

In Outcome 1, learners must demonstrate knowledge and understandings of the construction and working principles of a selection of Land-based machines commonly used in their area of study and demonstrate knowledge of the work and performance parameters of such machines.

In Outcome 2, learners will demonstrate an ability to prepare the machine for field operations and ensure that the machine is matched and correctly connected to a suitable power unit. Machines are to be selected from the 'range/scope' list outlined in the unit content. It is essential that manufacturers' recommendations be followed to enable machines to be initially set to achieve given fieldwork criteria.

In Outcome 3, learners will need to explain safe operational procedures and carry out risk assessment prior to engaging in fieldwork. Suitable field procedures are to be demonstrated, regular checks to be made on machine performance and necessary adjustments made to both machine and power unit to meet given fieldwork criteria economically and efficiently.

In Outcome 4, following fieldwork operations, learners must carry out pre-storage maintenance, carry out an inspection to identify and subsequently rectify any faults. Wearing components will need to be assessed and replaced if wear limits are reached. Throughout the unit the emphasis will be on safe, legal practices, working to manufacturers' recommended procedures and attention to detail when recording information.

Depending on the Land-based area the learner is studying, formal lecture delivery may be generic to all areas but practical experiences and learning should be appropriate to the area of study.

References

Books

Balls, R. 1985. Horticultural Engineering Technology: Field Machinery. Hampshire: Palgrave Macmillan. ISBN 0333364341
Level 3 Certificate, Subsidiary Diploma, 90-Credit Diploma, Diploma, Extended Diploma in Horticulture (0078-03)

Unit 305

Undertaking Land-based Machinery Operations

Bell, B. 2008. *Farm Machinery*. Ipswich: Old Pond Publishing. ISBN 1903366682.

Culpin, C. 1992. *Farm Machinery* 12th ed. Sussex: Wiley Publishing. ISBN 063203159X

Journals

Farmers Weekly
Amenity Machinery and Equipment
Profi International

Websites

www.hse.gov.uk Health and Safety Executive
Manufacturer's websites

Unit 306

Participate in Business Planning and Improvement in the Land-based Sector

Level: 3

Credit value: 10

Unit aim:

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

The learner will explore business improvement, including opportunities for diversification, how it can give a competitive advantage and reduce environmental impact. They will learn the skills necessary for developing a business idea, and preparing a business plan.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Understand business improvement in land-based industries
2. Be able to identify and plan opportunities for practical business improvement
3. Be able to develop a land-based business idea
4. Be able to prepare a business plan

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 306 Participate in Business Planning and Improvement in the Land-based Sector

Outcome 1 Understand business improvement in land-based industries

Assessment Criteria

The learner can:

1. Describe **strategies** that a land-based business can adopt to **improve performance**
2. Describe ways that a land-based business can achieve **competitive advantage**
3. Describe how a land-based business can improve its **environmental impact**

Unit content

Strategies

Consolidation, expand market share, product development, market development, diversification, (opportunities and risks) and Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis

Improve performance

Improved effectiveness and efficiency in key business functional areas, e.g. products, services, marketing, customer relations, staffing, staff management, working practices, production efficiency, financing, financial control, internal factors impacting on business performance (e.g. resources and management), external factors impacting on performance (e.g. political, economic, socio-cultural and technological)

Competitive advantage

Price, differentiation (e.g. quality, location, customer service and perceived added value), use of marketing mix (product, price, place and promotion)

Environmental impact

Resource use, waste, recycling, pollution (chemical, biological, visual, audible, light), road traffic, carbon footprint, enhancement of the environment (e.g. preservation or creation of habitats, conservation of structures), principles of sustainability, relevant environmental legislation (e.g. Wildlife and Countryside Act 1981 (as amended 1991), Environmental Protection Act 1990 (as amended 1995), Control of Substances Hazardous to Health (COSHH) 2002, The Control of Pollution Regulations (Oil Storage) (England) Regulations 2001, Water Framework Directive (WFD), Cross Compliance, Nitrates Directive, Waste Management (England and Wales) Regulations 2006

Unit 306

Participate in Business Planning and Improvement in the Land-based Sector

Outcome 2

Be able to identify and plan opportunities for practical business improvement

Assessment Criteria

The learner can:

1. Identify **potential improvements** in a business within a land-based context
2. Prepare a **plan for achieving business improvements** or **diversification** within a land-based context

Unit content

Potential improvements

Improvements in key business functional areas, e.g. products, services, marketing, customer relations, staffing, staff management, working practices, production efficiency, financing, financial control, importance of continuous improvement

Plan for achieving business improvements

Specific actions, rationale, timescale, resource implications, financial implications (costs, likely returns), key factors for success and risks

Diversification

Opportunities for diversification (e.g. forward, backward, horizontal), related, unrelated, evaluation of opportunities in relation to resources, skills and finance needed

Unit 306

Participate in Business Planning and Improvement in the Land-based Sector

Outcome 3

Be able to develop a land-based business idea

Assessment Criteria

The learner can:

1. Develop a land-based **business idea**
2. **Research the market** for a land-based business idea

Unit content

Business idea

Establishment of a new business, diversification or development of new enterprise and implement improvements to an existing business

Research the market

Market analysis (size, trends, competition, segmentation, target market), primary and secondary research

Unit 306

Participate in Business Planning and Improvement in the Land-based Sector

Outcome 4

Be able to prepare a business plan

Assessment Criteria

The learner can:

1. Produce a **business plan** to meet given specifications
2. **Present** a land-based business plan

Unit content

Business plan

Purposes of the business plan, business products or services, aims and objectives, market analysis (size, trends, competition, segmentation, target market), physical resources (e.g. property, machinery, vehicles, equipment and stock), human resources (staffing structure, management and key personnel, job descriptions and person specifications), promotion (media and cost), financial forecasts (setting up costs, pricing, income, costs, profit and monthly cash flow forecast), finance needs, sources of finance (equity, borrowing and grants), legal issues e.g. legal status (sole trader, partnership, company, franchise and co-operative), trading terms and conditions, trading standards, licences, relevant current legislation, planning permission, health and safety, fire regulations, regulatory bodies, sources of advice (solicitor, accountant)

Present

Different audiences (e.g. bank, investors and business management), written report format, oral presentation

Unit 306 Participate in Business Planning and Improvement in the Land-based Sector

Notes for guidance

This unit allows learners to explore the importance of improvement and planning for future business development. It should be related to the types of business relevant to the learners' vocational area and can include all forms of business, including not-for-profit organisations, not just commercial private sector businesses.

In Outcome 1, learners will investigate how business improvement should be sought in all of the key functional areas. They will discover that a sound business strategy derives from an understanding of current strengths, weaknesses, opportunities and threats and provides a focus for future improvements and development. They will also learn about the importance of sustainability and the need for businesses to reduce their environmental impact. The use of case studies and business visits would enhance the learning about these issues.

Outcome 2 progresses from the learning about business improvement in outcome 1. Learners will identify specific improvements that could be made in a selected business from some of the key functional areas listed. These improvements could involve opportunities for business diversification, but learners should be cautioned that diversification is often a high risk strategy and opportunities need to be carefully evaluated. They will need to prepare a detailed plan for implementation of proposed improvements.

Outcomes 3 and 4 include a broad range of content and delivery of the module should allow for this. In outcome 3 learners need to propose a land-based business development. This could be based on business improvements or developments identified in outcome 2, a diversification proposal or for a new business start-up.

In Outcome 4, learners need to prepare a business plan for the business idea developed in Outcome 3. The completed business plan should be addressed to a specific audience and include business products or services, aims and objectives, market analysis, physical resources, human resources, promotion, financial forecasts, finance needs, sources of finance, legal issues. It would help learners if they can be provided with a suitable template for construction of the business plan.

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

References

Books

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Jones, R. Raffo, C. and Hall, D. 2004. *Business Studies*, 3rd Edition Causeway Press
Nix, J. Farm Management Pocketbook
Warren, M. 1997. *Financial Management for Farmers and Rural Managers* Blackwell
Lewis, R. & Trevitt, R. 1997. *BTEC National Business* Nelson Thornes
Dooley, D. Dransfield, R. 2007 Goymer, J. & Guy, P. *BTEC National Business* Heinemann
Barrow, C. Tiffany P & Peterson S 2004 *Business Plans for Dummies* (John Wiley & Sons)
Finch, B. 2006. *How to Write a Business Plan* Kogan Page

Level: 3

Credit value: 10

Unit aim

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

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

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to construct, repair or maintain boundaries
2. Be able to construct, repair or maintain structures
3. Be able to construct, repair or maintain surfaces
4. Be able to carry out practical habitat management work

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

CU22.1 Construct, maintain and repair boundaries

CU20.1 Maintain structures and surfaces

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SCC

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 307

Undertake Estate Skills

Outcome 1

Be able to construct, repair or maintain boundaries

Assessment Criteria

The learner can:

1. **Prepare the site** appropriately
2. Select appropriate **equipment and materials**
3. Carry out the **construction, repair or maintenance** of selected **boundaries** to meet given specifications

Range

Boundaries

Living boundaries (hedge, bank, ditch), constructed boundaries: fence (post and rail, post and wire, electric, netting), wall (stone, brick)

Unit content

Prepare the site

Plan activity, clear debris, ensure livestock safety, location (power supply, waste disposal, equipment and materials storage)

Equipment and materials

Materials selected relevant to task, health and safety, sustainable practice, cost implications

Construction, repair or maintenance

Undertaken safely (use of risk assessment, appropriate Personal Protective Equipment (PPE)) and to the required standards

Unit 307

Undertake Estate Skills

Outcome 2

Be able to construct, repair or maintain structures

Assessment Criteria

The learner can:

1. **Prepare the structure** appropriately
2. Prepare and ready appropriate **equipment and materials**
3. Carry out the **construction, repair or maintenance** of selected **structures** to meet given specifications.

Range

Structures

Wooden structures (gate, stile, horse jump, bird box, table, bench, door), other structures requiring repair or maintenance (animal house or pen, machinery or feed store)

Unit content

Prepare the structure

Cut required sizes, wood preparation (sanding, planing, filling), check design specification, plan activity

Equipment and materials

Equipment and materials prepared based on manufacturer instructions, health and safety, sustainable practice, cost implications

Construction, repair or maintenance

Undertaken safely (use of risk assessment, appropriate Personal Protective Equipment (PPE)) and to the required standards

Unit 307

Undertake Estate Skills

Outcome 3

Be able to construct, repair or maintain surfaces

Assessment Criteria

The learner can:

1. **Prepare the surface** appropriately
2. Prepare and ready appropriate **equipment and materials**
3. Carry out the **construction, repair or maintenance** of a selected **surface** to meet given specifications.

Range

Surface

Solid (decking, concrete, paving), Loose (gravel, wood chippings, sand)

Unit content

Prepare the surface

Plan activity, clear debris, ensure livestock safety, location (power supply, waste disposal, equipment and materials storage)

Equipment and materials

Equipment and materials prepared based on manufacturer guidelines, health and safety, sustainable practice, cost implications, timeliness for example preparing concrete at the right time for construction

Construction, repair or maintenance

Undertaken safely (use of risk assessment, appropriate Personal Protective Equipment (PPE)) and to the required standards

Unit 307

Undertake Estate Skills

Outcome 4

Be able to carry out practical habitat management work

Assessment Criteria

The learner can:

1. Carry out appropriate **risk assessments**
2. Safely carry out appropriate **practical habitat management** to given specifications
3. Recommend **improvements** for future work

Unit content

Risk assessments

Risk assessments completed and used, use of Personal Protective Equipment (PPE) appropriate to the tasks (safety boots, overalls, gloves, and eye protection), and safe methods of working

Relevant legislation and codes of practice: Health and Safety at Work etc Act 1974, Control of Substances

Hazardous to Health (COSHH) 2002, Waste Management (England and Wales) Regulations 2006, Construction (Design and Management) Regulations 2007

Practical habitat management

Mowing, renovation, planting and staking as applicable, clearing (path, fence line), coppicing, uprooting, hedge maintenance, pruning, thinning, cutting or mowing and mulching, pond, stream and ditch clearance

Good practice: composting, materials that can be composted, re-used and/or recycled, finding alternative uses, methods of recycling, avoid wastage

Reduce environmental damage - Pollution (water courses, through litter or debris, noise), damage to habitats, and wastage of resources

Disposal of waste: organic waste (recycling, composting, chipping, burning), inorganic waste (recycling, landfill, discarding safely)

Improvements

Setting habitat management objectives, planning activities and resources, monitoring activities and resources, reviewing outcomes against objectives, recommendations and improvements

Notes for guidance

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

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

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

In Outcome 1, learners will develop the practical skills needed to construct, repair or maintain at least two different boundaries, including a living boundary and a constructed one.

In Outcome 2, learners will construct, repair or maintain at least two different structures. It is anticipated that learners will develop an understanding of how to construct a wooden structure, but are not expected to be able to construct larger structures such as animal or machinery housing. It is anticipated that delivery will include repair and maintenance of such larger structures as would be found in an estate setting.

In Outcome 3, learners are required to construct, repair or maintain one surface from the range shown. Delivery may include visits to see a range of surfaces and their properties and maintenance requirements.

In Outcome 4 it is anticipated that delivery of this outcome will be embedded in the practical skills development within the other three outcomes. These outcomes could also be developed in conjunction with learners' work experience at an appropriate placement.

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

References

Books

Agate E. 2001. *Fencing: A Practical Handbook*. BTCV. ISBN 094675229X

E. 2001. *Footpaths: A Practical Handbook*. BTCV. ISBN 0946752311

Agate E. 2000. *Toolcare: A Maintenance and Workshop Manual*. BTCV. ISBN 0946752249

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Brooks A and Agate E. 2001. *Waterways and Wetlands: A Practical Handbook*. BTCV. ISBN 0946752303
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 MacLean M. 1992. *New Hedges for the Countryside. Farming Press Books and Videos*. ISBN 0852362420
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 Stokes A. 1999. *Health and Safety Overview for Practical Conservation Project: A Guide to Good Practice for Conservation Groups and Land Managers*. BTCV.

Journals

Ecology
 Environmental Management
 Farmers Guardian
 Farmers Weekly
 Landwards
 Organic Farming

Websites

www.btcv.org.uk	British Trust for Conservation Volunteers
www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.wales.gov.uk	Welsh Assembly Government
www.scotland.gov.uk	Scottish Executive Environment and Rural Affairs Department
www.dardni.gov.uk	Department of Agriculture and Rural Affairs (Northern Ireland)
www.fwag.org.uk	Farm Wildlife and Advisory Group
www.hse.gov.uk	Health and Safety Executive
www.lantra.co.uk	Lantra Sector Skills Council

Unit 308

Manage Advanced Nursery Stock Production

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to prepare and plan for nursery stock production in containers, in protected and outdoor situations. The learner will also be able to establish and maintain nursery stock, both on the nursery and in the retail situation that is often present on nurseries that have retail sales areas.

Learning outcomes

There are **five** learning outcomes to this unit. The learner will:

1. Understand how to plan nursery stock production activities
2. Be able to establish container-grown nursery stock
3. Be able to manage the development of nursery stock
4. Understand field production of nursery stock
5. Be able to manage the health and growth of plants in nursery sales environments

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

PH5 Promote the growth and development of crops

PH6 Control the preparation of a site for planting PH7

Control the planting of crops

PH12 Plan and maintain the collection of orders

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 308

Manage Advanced Nursery Stock Production

Outcome 1

Understand how to plan nursery stock production activities

Assessment Criteria

The learner can:

1. Evaluate the **suitability of sites** for nursery stock production
2. Analyse the **facilities and resources** required for nursery stock production
3. Describe the **planning process** for nursery stock production

Unit content

Suitability of sites

Size, aspect, shelter, services, planning permissions, market(s), labour availability, financial implications, orientation, rainfall, access, slopes, light, climate microclimate for field production, also soil type and structure, texture, depth, drainage, pH, soils free from contaminants

Facilities and resources

Structures: for growing, potting, propagation, administration, storage, wastes, welfare

Resources: areas for storage and preparation of growing media, equipment for preparation of growing media, fertiliser, areas for potting, potting equipment, containers, equipment and materials for support, training and development of growth, irrigation equipment, tanks/reservoirs, power supply, generator, compressor, equipment for liquid feeding, feed mixing, water softening, equipment and materials for the storage and application of pesticides and ancillary equipment, transport and handling equipment and materials (trolleys, tractors, trailers, forklift, conveyors, crates, barrows), waste handling and disposal equipment and materials, equipment and materials (including computers) for monitoring of the growing environment and for administration of the nursery, human resources for horticultural and administrative activities

Planning process

Growing systems, plant range, crop/plant numbers (density) to be produced, facilities, site preparation, environmental control (outdoors, protected), crop establishment, maintenance of crop growth, pest and disease control, disposal of crop waste, reduction of environmental impact, costs, market(s) and market research, date(s) for availability, labour availability

Unit 308

Manage Advanced Nursery Stock Production

Outcome 2

Be able to establish container-grown nursery stock

Assessment Criteria

The learner can:

1. Ensure that **sites and resources** are available and ready for potting nursery stock
2. Pot up, pot on and stand down/set out **nursery stock**

Unit content

Sites and resources

Sites: potting area, potting bench, potting machine, transport equipment, area for growing on
Resources: containers, growing media, plant material, containers and materials for waste clearance and disposal, labels, support and training materials, pruning/trimming tools/equipment, related tools and equipment, transport equipment, labour

Facilities/equipment arranged ergonomically

Nursery stock

Pot up/off container grown stock, pot on container grown stock, selection of containers, growing media, fertilizer/feed, support, potting depth, plant/container cleaning, pruning/trimming, label, irrigation method(s)
Stand down/set out stock, on benching and/or ground as necessary (outdoors/under protection), straight lines, spacing

Unit 308

Manage Advanced Nursery Stock Production

Outcome 3

Be able to manage the development of nursery stock

Assessment Criteria

The learner can:

1. **Manage the growth** of nursery stock to ensure development to market requirements
2. Identify, control and dispose of **unwanted plant growth** to meet environmentally sound practice
3. Manage the **collection and despatch** of plants.

Unit content

Manage the growth

Size of plant, container size and type, plant shape and habit, stage of development, pest, disease and disorder monitoring and control, irrigation, application of feed, provision of optimum environmental conditions (light, water/moisture/humidity, temperature), weather and seasonal protection

With reference to British Standards (BS) 3936

Unwanted plant growth

Weeds, excessive and badly positioned plant growth, diseased and damaged growth, suckers and non-typical growth (reversion), environmental disposal of waste

Collection and despatch

Collection according to picking lists, preparation (cleaning) and grading (quality, size and health), labelling, pricing, irrigation, packaging, temporary storage, transport method

Unit 308

Manage Advanced Nursery Stock Production

Outcome 4

Understand field production of nursery stock

Assessment Criteria

The learner can:

1. Review the **equipment** available for the field production of nursery stock
2. Explain the **production systems** available for the production of
 - propagation stock
 - bare-root woody plants for sale and containerisation
 - deciduous and evergreen stock
3. Explain the **formula** for specifying nursery stock
4. Explain the **management** of field-grown nursery stock.

Unit content

Equipment

Soil cultivation equipment (tractor operated, pedestrian operated, manual), equipment for the management of weeds, pests and diseases on a field scale, equipment for the management of growth and development of stock (support, training, undercutting, irrigation), equipment for lifting/harvesting, transport and handling equipment

Production systems

For: rootstock production, field grafting and budding, production of bare-root and root-wrapped trees and shrubs, production of field grown woody stock for containerisation, evergreen and deciduous stock.

Production systems to include those focused on specific crops e.g. seed raised for landscape and forestry use, vegetatively propagated for garden and retail use

Formula

Reference to British Standards (BS) 3936)

Management

Maintenance of crop growth: planting methods, plant size, shape, habit, stage of development of plants, irrigation, application of feeds, management and control of weeds, excessive and badly positioned plant growth, pest, disease and disorder monitoring and control, damaged growth, suckers and non-typical growth, transplanting and undercutting, weather and seasonal protection, methods of reducing environmental impact and waste management, losses and contingency plans

Unit 308

Manage Advanced Nursery Stock Production

Outcome 5

Be able to manage the health and growth of plants in nursery sales environments

Assessment Criteria

The learner can:

1. **Maintain plants** in a nursery sales situation to ensure that optimum condition is maintained for the maximum duration
2. Identify and respond to **pests, diseases and disorders**

Unit content

Maintain plants

By: irrigation, feeding, pruning/trimming, supporting/tying, weeding, dead-heading, stock rotation and display, monitoring and control of pest, diseases and disorders, provision of adequate space

Pests, diseases and disorders

Examples as applicable to crops of insect pests, molluscs, rodents, mites, fungal problems, problems of excessive and under-watering, lack of feeding-nutrient deficiencies, physical damage, frost and other weather-related problems (e.g. high transpiration rates)

Unit 308 Manage Advanced Nursery Stock Production

Notes for guidance

The unit is primarily concerned with the planning and production of container grown nursery stock, but an understanding of field-grown stock is required in Outcome 4.

Emphasis should be placed upon safe working practices and the safety of self and others, including the general public, at all times. Learners will need to be aware of Personal Protective Equipment (PPE) requirements and that of the Food and Environment Protection Act 1990 (as amended 1995) (FEPA) and Control of Substances Hazardous to Health (2002) (COSHH) legislations.

Outcome 1 is concerned with the planning and evaluation of the suitability of sites, location, facilities and resources for container production. This can be undertaken at the centre if facilities are suitable or undertaken as part of a site visit to a commercial unit. There should be awareness of scales of production and the different requirements and constraints that pertain to small and larger nurseries. Learners must be able to recognise and analyse facilities and resources required for production and describe the planning process for the production of specified crops.

Outcome 2 requires learners to plan and prepare for both potting up/off and potting on of nursery stock, as well as standing down (setting down) the crop after potting on the ground and/or on benches. This should include a clear understanding of hygiene requirements, space and accuracy in positioning to allow for future growth, maintenance and development of the crops. In order to enhance practical skills, learners must (by hand) pot up/off (rooted cuttings) a minimum of twenty five (25) plants and pot on a minimum of twenty five (25) plants. They must also stand down (set down) those plants.

Outcome 3 covers the growth and development of crops. Learners should be able to plan the management of particular examples of nursery stock growing in containers (e.g. evergreen shrubs, herbaceous perennials, hedging or fruit trees) and undertake activities relating to their growth and development to target/sales period. The maintenance of health will include recognition of pests, diseases and disorders. If learners are to undertake chemical control of problems then she/he must hold appropriate the qualifications to apply pesticides. Learners will also need to have the opportunity to manage the preparation and collection plants for despatch against a brief.

Outcome 4 is about the understanding of field growing of nursery stock. If the centre does not undertake the activity a visit to a field producer of trees or shrubs should be carried out if possible. Specification of nursery stock refers to the size and growth patterns of crops (e.g. caliper size, undercutting, transplanting). Learners will need to identify and review the equipment and facilities available for the field production of nursery stock together with explaining the production and management systems available for bare-root deciduous and evergreen woody stock plants for sale and containerization.

Outcome 5 involves the maintenance of plants in a retail area, as is often found on nursery units. Activities to be carried out are those that would take place for 'short-term' plant maintenance. The safety and health of self, the general public and all others must be paramount in all activities and it is essential that the learner is able to demonstrate competence in this aspect. Learners must identify five (5) pests, five (5) diseases and FIVE (5) plant disorders associated with nursery stock production and know how to respond to them.

The unit may be delivered by a wide range of techniques including lectures, supervised practical work, discussions, video or DVD, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible and every opportunity should be taken to show how the knowledge acquired in this unit may be applied to practical horticultural tasks. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

Learners would greatly benefit from the opportunity to visit renowned commercial nursery stock producers, in order to better appreciate the facilities, resources, scale of operation, growing and planning techniques available.

References

Books

Adams, C.R., Early, M.P. 2004 *Principles of Horticulture*. Oxford: Butterworth-Heinemann. ISBN 9780750686945.

Brown, L. 2008. *Applied Principles of Horticultural Science*. Oxford: Butterworth-Heinemann. ISBN 9780750687027.

Dawson, P. 2006. *A Handbook for Horticultural Students*. Rushden: Dawson Books. ISBN 0-9525911-11

Lamb, K., Kelly, J., Bowbrick, P. 1995. *Nursery Stock Manual: Grower Manual 1*. London: Grower Books. ISBN 0901361 801.

BS3936 – British Standards Institute

Websites

www.GoHelios.co.uk

National Plant Specification

Unit 309

Undertake Horticultural Production Techniques - Outdoors

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to prepare cropping plans for outdoor horticultural crops and to prepare sites, plant, manage and harvest crops.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Know the requirements of site preparation and planning for outdoor crops
2. Be able to prepare sites and establish outdoor horticultural crops
3. Be able to manage outdoor horticultural crops
4. Understand harvesting and grading requirements of outdoor horticultural crops

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

PH5 Promote the growth and development of crops

PH6 Control the preparation of a site for planting PH7

Control the planting of crops

PH12 Plan and maintain the collection of orders

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 309

Undertake Horticultural Production Techniques - Outdoors

Outcome 1

Know the requirements of site preparation and planning for outdoor crops

Assessment Criteria

The learner can:

1. Analyse sites for **suitability for outdoor cropping**
2. Describe **planning requirements** for outdoor crops
3. Evaluate the **seasonal factors** affecting outdoor cropping.

Unit content

Suitability for cropping

Site survey: services, access, site orientation, access to markets and labour, soil types and structure, texture, depth, soils free from contaminants, drainage, nutrient status, pH, climate and micro-climate factors, light, rainfall, aspect, slopes, shelter, altitude, latitude

Planning requirements

Relevant current legislation, Planning Regulations Environment Act (1995), Water Act 1965 (as amended 2003), Environmental impact assessment

Seasonal factors

Soil temperature, day length, light levels, first and last frost dates, average rainfall, average aerial day and night temperatures

Unit 309

Undertake Horticultural Production Techniques - Outdoors

Outcome 2

Be able to prepare sites and establish outdoor horticultural crops

Assessment Criteria

The learner can:

1. **Clear and prepare** sites in readiness for planting of outdoor crops
2. **Improve and manage** the soil condition to meet plant requirements
3. **Establish outdoor crops**

Unit content

Clear and prepare

For: sowing, sticking and planting

Clear: crop residues, weeds

Prepare: by primary, secondary and final cultivations, bed preparation marking out

Consider: sub-soiling and drainage, water tables, ploughing, use of rotary cultivator, harrowing, nutritional and pH status bed formation, level and tilth production, firming/consolidation

Improve and manage

Ensure adequate drainage and aeration to suitable depth, check and improve as necessary, soil structure, organic matter and moisture content, pH, nutrient status, application of base dressings, soil disorders, weed control

Establish outdoor crops

Planting depth and methods, plant size, shape, habit, stage of development of plants, support, irrigation, application of feeds (base and top dressings), management and control of weeds, pest, disease and disorder monitoring and control, removal of damaged growth, suckers and non-typical growth, transplanting and undercutting, weather and seasonal protection, methods of reducing environmental impact and waste management, losses and contingency plans

Unit 309

Undertake Horticultural Production Techniques - Outdoors

Outcome 3

Be able to manage outdoor horticultural crops

Assessment Criteria

The learner can:

1. Ensure that suitable protection from **adverse environmental impacts** are put into place
2. Manage the **growth and development** of outdoor crops
3. **Harvest or collect and prepare** plant material for sale
4. Work according to best **health and safety** guidelines and practice

Unit content

Adverse environmental impacts

Provision of shelter, frost protection, weeds, pests, diseases, disorders (monitoring and control), timing of operations, irrigation

Growth and development

Provision of water, nutrients, support/training if required, recognition and control or management of weeds, pests and diseases, development to meet scheduled cropping/harvesting dates

Harvest or collect and prepare

Harvest: by hand or mechanically

Collect and prepare: grading, cleaning, washing, handling and packing, labelling, pricing, drying adherence to customer specifications, plant passports, field heat reduction, cold storage, modified atmosphere (all as applicable to the crops being collected)

Grade for sale by size, vigour, shape, height, weight, quality, quantity, damage/pests/disease/disorder free

Health and safety

Relevant current legislation to include: Environment Act (1995), Water Act 1965 (as amended 2003), Food and Environment Protection Act 1990 (as amended 1995), The Trade Descriptions Act 1968, The Control of Substance Hazardous to Health Act 2002 (COSHH), Management of Health and Safety at Work Regulations 1992 (as amended 1999), The Health and Safety at Work etc Act 1974, Environmental impact assessment

Unit 309

Undertake Horticultural Production Techniques - Outdoors

Outcome 4

Understand harvesting and grading requirements of outdoor horticultural crops

Assessment Criteria

The learner can:

1. Analyse **methods** of ensuring crops are harvested and graded to meet customer and market requirements
2. Describe means of dealing with **waste** and minimising **adverse environmental impacts**.

Unit content

Methods

Harvest and grade: by hand, mechanically

Grading, cleaning, washing, handling and packing, labelling, drying adherence to customer specifications, plant passports, field heat reduction, cold storage, modified atmosphere (all as applicable to the crops being collected)

Reference to British Standards (BS) 3936)

Waste

Waste management: collection, transport, monitoring, processing, recycling or disposal (solids and liquids)

Organic: crop residues, weeds, soil

Inorganic: production waste (containers, and packaging waste), labelling materials, chemicals

Efficient and effective use of materials

Waste and Resources Action Programme (WRAP)

Adverse environmental impacts

Spillage, leakage, crop losses, crop residues, contaminated wastes, spray drift

Unit 309

Undertake Horticultural Production Techniques - Outdoors

Notes for guidance

This unit is applicable to cultivation of 'field-grown' horticultural crops such as salads, outdoor cut flower crops ornamentals crops. It does not apply to the production of field grown nursery stock which is dealt with in a separate unit. The focus of the unit can be on one crop or group of crops or applied generally to a wide range of possibilities.

Outcome 1 requires that learners are aware of the factors involved in site selection and suitability, to include all relevant aspects of soil type and condition, and all relevant factors of the climate and microclimate of the site. It would be useful if learners had the opportunity to carry out a site analysis. It is essential that learners are fully acquainted with the constraints of the site so that an informed decision on its likely success can be made for the crop(s) under consideration. The learners are also required to identify and describe likely planning requirements (inclusive of current legislation) and evaluate the many seasonal factors that may affect outdoor cropping such as soil temperatures, day length, light levels, average rainfall, average day and night temperatures.

The crop(s) being studied should have all relevant points noted above taken into consideration in the planning of an annual (or otherwise appropriate) cropping schedule which would be viable and successful for current market conditions.

Outcome 2 covers the practical activities involved in clearing and preparing sites for seed sowing, sticking cuttings and planting/establishing crops. Learners must also demonstrate the ability to identify and carry out methods to improve and manage the soil in order to meet specified plant requirements, together with actually assisting in the establishment of outdoor crops. These activities may be carried out by hand or mechanically and should be appropriate to the crop(s) being studied.

Outcome 3 covers the management of growing crops. Learners should undertake all relevant activities, by hand and/or mechanically, inclusive of ensuring that suitable crop protection is identified and put into place in order to counteract adverse environmental conditions. It may be that due to earlier preparation some management tasks are not required, but it is essential that all those are necessary are undertaken with particular emphasis on weed control and pest and disease management. The final part of this outcome requires that the candidate harvests/collects, and prepares, the crop to meet market requirements. All activities must be undertaken in line with the current best health and safety guidelines and practice.

Outcome 4 involves the learner in reviewing the options for methods of harvesting and grading crops for sale with reference to market requirements. This may be done by visits to events or 'best practice' operations. Waste, and the management of adverse environmental impact, should be integral to all current practice, and may be undertaken with reference to shows and events, as well as by contact with specialist organisations such as the Waste and Resources Action Programme (WRAP).

The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, video or DVD, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible and every opportunity should be taken to show how the knowledge acquired in this unit may be applied to practical horticultural tasks. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities. Learners would greatly benefit from the opportunity to visit outdoor crop producers, in order to better appreciate the facilities, resources, scale of operation, growing and planning techniques available.

References

Books

Adams, C.R., Early, M.P. 2004. *Principles of Horticulture*. 4th ed. Oxford: Butterworth-Heinemann.

Brown, L. 2008. *Applied Principles of Horticultural Science*. 3rd ed. Oxford: Butterworth-Heinemann, ISBN 9780750687027.

Dawson, P. 2006. *A Handbook for Horticultural Students*. Rushden: Dawson. ISBN 0-9525911-11

Lamb, K., Kelly, J., Bowbrick, P. 1995. *Nursery Stock Manual: Grower Manual 1*. London: Grower Books. ISBN 0901361 801.

Grower Manuals

Horticulture Week incorporating 'the Grower' magazine

As the context of the unit is not specified, other recommended reading is not given on this occasion. The centre should recommend suitable current reference material, which may include grower manuals or websites, as related to the crop.

Unit 310

Undertake Horticultural Production Techniques - Protected

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to understand the requirements of production horticulture in protected environments and will be able to produce and prepare crops for market.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Know how to plan production of crops in protected growing environments
2. Be able to establish crops in containers in protected environments
3. Be able to establish crops in the ground in protected environments
4. Understand the maintenance, harvesting and grading requirements of protected horticultural crops

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

PH5 Promote the growth and development of crops

PH6 Control the preparation of a site for planting PH7

Control the planting of crops

PH12 Plan and maintain the collection of orders

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 310

Undertake Horticultural Production Techniques - Protected

Outcome 1

Know how to plan production of crops in protected growing environments

Assessment Criteria

The learner can:

1. Evaluate **facilities and environments** for protected plant production including green/glass houses and other structures
2. Describe the required **physical and human resources** for plant production in protected environments
3. Describe the preparation of a **potting schedule**, including required resources

Unit content

Facilities and environments

Facilities: green/glass houses, polythene tunnels, net tunnels, combined polythene/net tunnels, growth and growing rooms, cloches, cold and heated frames

Environments: for growing, potting, propagation, administration, storage, wastes, welfare, to include: mist units, fog units, closed cases, provision of supplementary, photoperiodic and replacement lighting, shading, heated benching, aerial heating and distribution, ventilation, Co2enrichment, space utilisation

Physical and human resources

Physical resources: propagation facilities as above, areas for storage and preparation of growing media, equipment for preparation of growing media, fertiliser, areas for potting, potting equipment, containers, equipment and materials for support, training and development of growth, irrigation equipment, tanks/reservoirs, power supply, generator, compressor, equipment for liquid feeding, feed mixing, water softening (nitric acid injection into water supply), equipment and materials for the storage and application of pesticides and ancillary equipment, transport and handling equipment and materials (trolleys, forklift, conveyors, crates, barrows), waste handling and disposal equipment and materials, equipment and materials (including computers) for monitoring of the growing environment and for administration of the nursery Human resources (skilled and semi-skilled): for horticultural and administrative activities

Potting schedule

By hand/mechanical, scheduling from seed, cuttings, micro-propagation, timing/cropping dates, market and customer requirements, resource requirements to include: containers, growing media, fertilisers, environmental requirements and control systems, irrigation, growing on space, record keeping

Unit 310

Undertake Horticultural Production Techniques - Protected

Outcome 2

Be able to establish crops in containers in protected environments

Assessment Criteria

The learner can:

1. Prepare **growing media** for protected crops
2. **Pot** plants to commercially accepted standards

Unit content

Growing media

For seedlings/transplants and cuttings; for potting on established material, (preparation by hand and/or mechanical means), space for preparation and storage

Possible ingredients to include; peat, coir, rock-wool, bark, perlite (silvaperl), vermiculite, horticultural sand or grit, loam, fertiliser, nutrient content, pH, drainage, aeration

Pot

Pot plants by hand to include potting up/off rooted cuttings from trays, potting on

Potting area/bench: containers: growing media: number, position and depth in container, cleaning, support, pruning/trimming, irrigation

Be aware of mechanical methods (potting machines)

All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities, and Personal Protective Equipment (PPE) to be worn.

Unit 310

Undertake Horticultural Production Techniques - Protected

Outcome 3

Be able to establish crops in the ground in protected environments

Assessment Criteria

The learner can:

1. Plan and prepare **sites** to receive plants
2. **Establish plants** to optimise plant development
3. Ensure that **protection and suitable growing conditions** are provided
4. Describe means of minimising **adverse environmental impacts** as part of the process.

Unit content

Sites

Protective structure bed and border soils/tunnel substrates for; sowing, sticking and planting

Clear: crop residues, weeds

Prepare: by primary, secondary and final cultivations (by hand and/or mechanical), nutritional and pH status, partial sterilisation of border soils, bed formation, level and tilth production, firming/consolidation, irrigation, marking out

Establish plants

Young seedlings/transplants, cell/plug grown plants, plants needing careful handling, quantity, spacing, depth, establish by gentle firming, support, label, irrigation/watering

Protection and suitable growing conditions

Protection: from drying out, weeds, pests and diseases

Growing conditions: temperature, light, shade, ventilation, water/moisture/humidity, atmosphere (carbon dioxide, oxygen)

Adverse environmental impacts

Drying out (high evapotranspiration rate), scorch; cold water damage, temperature extremes, excessive or deficiencies of nutrients, provision of optimum environment

(water/moisture/humidity), temperature, light, shade, ventilation, humidity, atmosphere (carbon dioxide, oxygen), monitoring and control of pests, diseases and disorders

Unit 310

Undertake Horticultural Production Techniques - Protected

Outcome 4

Understand the maintenance, harvesting and grading requirements of protected horticultural crops

Assessment Criteria

The learner can:

1. Compare the **maintenance requirements** of specific crops in containers to crops in the ground
2. Analyse the **equipment and methods** used to harvest, prepare for sale and grade protected crops
3. Summarise the **storage requirements** of specific crops

Unit content

Maintenance requirements

Irrigation, feeding, temperature, humidity, ventilation, lighting, shading, atmosphere (carbon dioxide, oxygen), weed control, pest, disease and disorder management, growing media, pH and nutritional status, anchorage, support, pruning/trimming

Equipment and methods

Harvest (hand and mechanical) by pulling, cutting, picking, collecting, picking out

Preparation by washing, cleaning, drying, trimming, grading, handling and packing, labelling, pricing, adherence to customer specifications, plant passport regulations

Grade for sale by size, vigour, shape, height, weight, quality, quantity, damage/pests/disease/disorder free, all as applicable to the crops being collected

Storage requirements

Temporary at ambient temperature: cool room, cold storage, controlled and modified atmosphere, darkness, oxygen, carbon dioxide and ethylene gas levels as applicable to the crops being collected

Unit 310

Undertake Horticultural Production Techniques - Protected

Notes for guidance

This unit covers the production of container grown crops including seasonal bedding plants, flowering and foliage pot plants, cut flower crops growing in containers, bulbs to include prepared hyacinths, tulips, lilies and narcissi or in soil to include stocks, asters, chrysanthemums, antirrhinums, roses. Vegetable and salad crops in containers, soil or hydroponic conditions are also within the scope of the unit. Given this extreme variation in potential production systems it is expected that there will be, in practice, a narrower focus, and that the diversity will be covered in outline only, though visits to production nurseries which demonstrate the diverse range of cropping systems will be most valuable. There will be inevitably be areas of commonality between this unit and 'Advanced Nursery Stock Production'

Outcome 1 requires the learner to identify and evaluate facilities and environments for protected plant production including green/glass houses, polythene tunnels, net tunnels, combined polythene/net tunnels, growth and growing rooms, cloches, cold and heated frames. Learners should know the uses of each of the structures and be able to define the term "protective structure". They must also be able to differentiate between a mist unit and a fog unit and identify and describe the required physical and human resources for plant production under cover, together with preparing a potting schedule plan, which includes identifying the required resources.

Outcome 2 covers the preparation of growing media and potting (up/off and on). This should be undertaken by hand (and if applicable machine). At all times the activities should be undertaken safely and risk assessments should be developed and reviewed by the learner as part of the process. Learners must be able to identify a minimum of eight (8) bulk ingredients of composts, inclusive of peat alternatives and appreciate their uses in growing media production. In order to enhance practical skills learners must (by hand) pot up/off (rooted cuttings) a minimum of twenty five (25) plants and pot on a minimum of twenty five (25) plants, they should also stand down (set down) those plants.

Outcome 3 involves the planning and preparation of soil and site for planting of crops. As indicated earlier this could be a cut flower crop such as stocks or chrysanthemums, a salad crop such as lettuce, or other appropriate crop. Learners must also have the opportunity to contribute to the establishment of plants in order to optimise their growth and development, this should include ensuring that protection and suitable growing conditions are provided and they must be able identify and describe means of minimising adverse environmental impacts as part of the process.

Outcome 4 covers the understanding of the maintenance and harvesting techniques required for specified crops and should be applied to the collecting and grading of both container and soil-grown plants. Learners must be able to identify and compare the maintenance requirements of named crops in containers to crops in the ground, analyse the equipment and methods used to harvest and prepare plants/produce for sale and know the varied grading requirements of named protected crops. They must also be able to summarise the storage requirements of specific crops, appreciating the reasons for the necessity for the provision of the optimum storage environment(s). Harvesting will be by hand (and mechanical if possible) by pulling, cutting, picking, collecting, picking out, grading must cover; size, vigour, shape, height, weight, quality, quantity, damage/pests/disease/disorder free. Learners should have the opportunity to actually carry out these tasks in order to confirm learning.

The unit may be delivered/or by a wide range of techniques, including lectures, supervised practical work, discussions, video or DVD, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible and every opportunity should be taken to show how the knowledge acquired in

Unit 310

Undertake Horticultural Production Techniques - Protected

this unit may be applied to practical horticultural tasks. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

Learners would greatly benefit from the opportunity to visit protected crop producers, in order to better appreciate the facilities, resources, scale of operation, plant quality, growing, planning, harvesting, grading and storage techniques available.

References

Books

- Adams, C.R., Early, M.P. 2004. *Principles of Horticulture*. 4th ed. Oxford: Butterworth-Heinemann.
- Brown, L. 2008. *Applied Principles of Horticultural Science*. 3rd ed. Oxford: Butterworth-Heinemann, ISBN 9780750687027.
- Dawson, P. 2006. *A Handbook for Horticultural Students*. Rushden: Dawson. ISBN 0-9525911-11
- Lamb, K., Kelly, J., Bowbrick, P. 1995. *Nursery Stock Manual: Grower Manual 1*. London: Grower Books. ISBN 0901361 801.

Journals

- Horticulture Week – weekly trade magazine
- Grower Manuals
- Commercial Greenhouse Grower - periodical

Unit 311

Undertake Retail Merchandising for the Land-based Sector

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of retail merchandising in the land-based sector and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training. This unit has been specifically developed for 14-19 year old learners in full-time education acquiring additional knowledge of retailing.

The learner will develop their customer service skills. The learner will understand how items are effectively displayed, along with how they are promoted and marketed. They will consider the principles of stock control and storage.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to deliver effective customer service
2. Understand how to display items for sale
3. Understand methods of promotion and marketing
4. Understand the principles of ordering, pricing and controlling retail stock

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

Skillsmart Retail has approved this unit to be used within Edexcel BTEC and City & Guilds qualifications only

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 311 Undertake Retail Merchandising for the Land-based SectorUnit

Outcome 1 Be able to deliver effective customer service

Assessment Criteria

The learner can:

1. Review the needs of different **customer groups**
2. Demonstrate effective **customer service skills**
3. Evaluate **customer service** in a given land-based outlet

Unit content

Customer groups

Individuals, businesses, customer classification e.g. age, sex, socio-economic group

Customer service skills

Effective communication (e.g. addressing customers face to face, appropriate telephone manner, effective written communication), courtesy, appropriate dress and body language, helpfulness, product knowledge

Customer service

Customer expectations, service standards, approach to customers, policies (e.g. refunds, complaints), after sales service, advice and assistance, compliance with Data Protection Act 1998

Unit 311

Undertake Retail Merchandising for the Land-based Sector

Outcome 2

Understand how to display items for sale

Assessment Criteria

The learner can:

1. Analyse the **customer flow** and **space layout** of a given land-based outlet
2. Evaluate **display systems**
3. Discuss the influence of **legislation** on goods displayed

Unit content

Customer flow

Direction of customer movements, clarity of store layout aiding customer flow, e.g. store plans, signage location and clarity, location of promotional offers

Space layout

Store design and plan including position of entrance and exit, location of tills, aisle widths, access for customers including those with disabilities

Display systems

Product groupings (e.g. by category of product, by species, according to perishability, seasonality, special promotions) types of display, location of displays

Legislation

Relevant legislation e.g. Sale of Goods Act 1968 (as amended 1979 & 1994), Trades Description Act 1968, Weights and Measures Act 1985, Consumer Protection Act 1987 (as amended 1994), Price Marking Order 2004

Unit 311 Undertake Retail Merchandising for the Land-based Sector

Outcome 3 Understand methods of promotion and marketing

Assessment Criteria

The learner can:

1. Compare **methods of promotion**
2. Evaluate **marketing strategies** for given land-based outlets
3. Recommend **improvements** to a given marketing strategy

Unit content

Methods of promotion

Advertising in different media, (e.g. radio, newspaper, internet, television), public relations and sponsorship, special offers and discounts, direct mailing

Marketing strategies

Strategies relating to the product (e.g. product design, product range, packaging), price, promotion (e.g. advertising, Public Relations and sponsorship, special offers and discounts, direct mailing), place (e.g. location, transportation, home delivery)

Improvements

Recommendations to support a given objective, e.g. increase market share, increase sales, increase customer base

Unit 311

Undertake Retail Merchandising for the Land-based Sector

Outcome 4

Understand the principles of ordering, pricing and controlling retail stock

Assessment Criteria

The learner can:

1. Explain **buying** and ordering processes
2. Evaluate **stock control** and **storage methods**
3. Review **pricing methods**

Unit content

Buying

Methods of payment, credit arrangements, methods of ordering, documentation, locating suppliers, stock delivery

Stock control

Stock rotation, planning to meet demand, monitoring stock

Storage methods

Perishable and non perishable items, security, storage of animal health products, minimising wastage, compliance with relevant legislation and guidelines, e.g. Veterinary Medicines Regulations 2009, DEFRA Code of Practice for Suitably Qualified Persons and Guidance for the Registration of Retail Premises 2008, Pet Animals Act 1951 (as amended in 1983)

Pricing methods

Cost based, competitor based and offers and discounts

Unit 311 Undertake Retail Merchandising for the Land-based Sector

Notes for guidance

This unit is designed to provide learners with an understanding of the important skills for those working in and managing land-based retail outlets. Centres are encouraged to find a selection of appropriate outlets which could be used for comparison and case study material. Examples may include pet shops, farm retail shops, equine suppliers and shops selling pet care products, but could equally include other outlets such as a shop within a zoo, cattery or animal health charity.

As learners will be visiting other businesses and organisations, there should be an emphasis on safe working practices and appropriate risk assessments should be undertaken.

In Outcome 1, the focus is on customer service skills. It is anticipated that delivery of this unit will be through a mix of formal lectures, visits to appropriate outlets, and the opportunity to practise customer service skills in a real or simulated situation. Work placement in an appropriate setting would also help learners to develop effective customer service skills. It will be important to explore the potential impact of good and poor customer service on the business's current and future customers, and thus on the success of the business.

In Outcome 2, after appropriate classroom based activity, the learner will need access to land-based retail outlets to enable them to carry out the required analysis and evaluation of customer flow, space layout and display systems. It may be helpful to visit a larger outlet, possibly one that is part of a national chain, and a smaller independently owned one for comparison and to stimulate debate about the key factors. The study of relevant legislation may be assisted by considering case study examples of where this has been breached and the consequences of this to the business.

Outcome 3 requires learners to review promotional methods and marketing strategies for a selected land-based outlet. This could be the same outlet or a different one to those studied for outcomes 1 and 2. It may be helpful to study a larger outlet where there is often more evidence of formal strategies. The evaluation of and recommendation of improvements to, a marketing strategy should be carried out in the context of a specific business objective.

Outcome 4 could be delivered through more formal classroom based activity but it would be beneficial if this is supplemented with real work examples, through visits or guest speakers. It is important that learners develop an understanding of the different storage, legislative and security considerations for the varied types of stock which may be sold through a land-based outlet. Specific examples that are of relevance include animal health products, feedstuffs and in the case of a pet shop, live animals. This outcome also looks at buying, ordering and pricing methods and case study material would be useful to explore an appropriate range of methods.

At level 3 learners will have significant experience as customers of retail outlets. This perspective and experience will be helpful in developing their understanding of customer service and marketing methods in the land-based sector. It will be important that teaching and delivery focuses on the application of knowledge and skills to outlets in the land-based sector that are as relevant as possible to learners' interests.

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Books

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| www.bized.co.uk | Business education website |
| www.businesslink.gov.uk | Business Link website |
| www.marketingteacher.com | Marketing resources |
| www.thetimes100.co.uk | Case study materials and resources |

Unit 312

Manage Plant Propagation Activities

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to understand the requirements of a commercial propagation facility and will be able to develop propagation schedules to meet production requirements. The learner will also be able to propagate plants by seed and a range of vegetative methods.

Learning outcomes

There are **five** learning outcomes to this unit. The learner will:

1. Know how to develop propagation schedules
2. Be able to manage vegetative propagation
3. Be able to manage seed propagation
4. Know how to manage the aftercare of propagated plants
5. Understand seed treatments and supply

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

PH9 Plan and maintain the production of plants by vegetative methods

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 312

Manage Plant Propagation Activities

Outcome 1

Know how to develop propagation schedules

Assessment Criteria

The learner can:

1. Describe the **environmental conditions** necessary for propagation by **seed and vegetative means**
2. Describe **propagation facilities** suited to seed and vegetative propagation
3. **Develop schedules** for seed and vegetative propagation.

Unit content

Environmental conditions

Air temperatures, temperature at point of regeneration or union (base temperature), moisture status, humidity, light levels (natural and artificial), shade, oxygen/carbon dioxide levels, hygiene, sterile or enhanced microbial conditions, germination and cold storage rooms, specific environmental conditions required for laboratory micro-propagation activity (growth room)

Seed and vegetative means

Seed: fine, medium and large awkward seed, seed sown outdoors, seed sown in protected environments (in containers), sowing of spores (true ferns)

Vegetative: division – hardy perennials, tender perennials, cuttings – soft, semi-ripe and hardwood stem, node/intermodal, deciduous and evergreen stem, whole leaf, foliar embryo, leaf section and leaf petiole, single-node stem/leaf bud, budding – shield (T), chip, grafting – splice, whip and tongue, side veneer, field, bench

Propagation facilities

Mist units, fog units, low polythene tunnels (closed cases), heated beds and benches, germination cabinets/germination rooms, protective structures - green/glass houses, polythene tunnels, net tunnels, combined polythene/net tunnels, growth and growing rooms, cloches, cold and heated frames, outdoor cuttings beds, seed beds, heated bins (garner bin), lined out rootstock beds for budding and grafting, hot-pipe grafting facilities

Develop schedules

By hand/mechanical, schedule for named seed and specified vegetative means, timings/dates, market and customer requirements

Resources required include containers, growing media, fertilisers, environmental requirements and control systems, irrigation, growing space, record keeping

Unit 312

Manage Plant Propagation Activities

Outcome 2

Be able to manage vegetative propagation

Assessment Criteria

The learner can:

1. **Collect and prepare** vegetative propagation material
2. Propagate plants by **division, cuttings, grafting and budding**
3. **Prepare growing media** suitable for vegetative propagation
4. Establish propagation material in the **propagation environment**

Unit content

Collect and prepare

Types: division, cuttings (softwood, semi-ripe, hardwood, root), budding/grafting, natural vegetative means (bulbs, corms, stolons, stem tubers, plantlets, foliar embryos)

Methods: time of year, time of day, removal from stock plant, tools (secateurs, snips, knives, spade, fork, dividing knife), resources (polythene bags, trays/boxes), select material which is 'true to type', of appropriate size, not too vigorous and pest and disease free

Division, cuttings, grafting and budding

Division: by hand of fibrous roots, of 'woody' roots, of herbaceous crowns

Cuttings: soft, semi-ripe and hard-wood stem (evergreen and deciduous), nodal and intermodal stem, single-node stem/leaf bud, foliar embryo, leaf section and leaf petiole, root cuttings ('thick' and 'thin'), use of rooting hormones and wounding where applicable

Grafting: bench grafting, field grafting, top-working

Budding: chip and shield (T), top-working

Tools/equipment to include: knives, secateurs, snips, forks, dividing knife

Prepare growing media

For seedlings/transplants and cuttings, (preparation by hand and/or mechanical means), space for preparation and storage

Possible ingredients to include: peat, coir, rock-wool, bark, perlite (silvaperl), vermiculite, horticultural sand or grit, loam, fertiliser

Propagation environment

Mist units, fog units, low polythene tunnels (closed cases), heated beds and benches, germination cabinets/germination rooms, protective structures - green/glass houses, polythene tunnels, net tunnels, combined polythene/net tunnels, growth and growing rooms, cloches, cold and heated frames, outdoor cuttings beds, seed beds, heated bins (garner bin), lined out rootstock beds for budding and grafting, hot-pipe grafting facilities

Unit 312

Manage Plant Propagation Activities

Outcome 3

Be able to manage seed propagation

Assessment Criteria

The learner can:

1. Carry out **collection and extraction** of seeds
2. Treat seeds to overcome **dormancy**
3. Prepare **growing media** suitable for seed sowing
4. **Sow seeds outdoors and under protection**

Unit content

Collection and extraction

The learner should understand the collection and extraction techniques of different types of named seed and collect and prepare at least ONE (1) dry seed and ONE (1) fleshy seed (fruit)

Considerations: timing, collection when seed is ripe, weather conditions, handling, containers for collection, label

Extraction: dry seed (pods/capsules split, extract debris and save seed) fleshy fruits (fermentation, remove seed and dry)

Maintain healthy and safety

Dormancy

The learner should be able to carry out straightforward techniques to overcome dormancy, such as scarification, fruit fermentation (to extract seed) and stratification

Growing media

Seed 'composts': nutrient content, pH, drainage, aeration, bulky components, space for preparation and storage

Possible bulk components may include peat, coir, perlite (silvaperl), vermiculite, horticultural sand or grit, loam

Seedbeds: structure, aeration and drainage, amelioration, enhancement by added mycorrhizae or similar

Sow seeds outdoors and under protection

The learner should be able to prepare ground/containers/growing media and sow a range of fine, medium and large seeds in trays, modules and in drills outdoors

Broadcasting into containers, fine seed with added carrier e.g. fine dry sand), seed that can be broadcast easily by hand without carriers, space sowing, and hygiene and safety maintained throughout, waste minimised.

Drills outside, preparation of V-shaped and flat bottomed drills by hand, depth and moisture content, seed scattered into drills or space-sown along the drill by hand, hygiene and safety maintained throughout, waste minimised. Drills watered prior to sowing if conditions dry

Unit 312

Manage Plant Propagation Activities

Outcome 4

Know how to manage the aftercare of propagated plants

Assessment Criteria

The learner can:

1. Monitor the **propagation environment**
2. Describe the weaning of plants from the **post-propagation stage to establishment**

Unit content

Propagation environment

Mist units, fog units, low polythene tunnels (closed cases), heated beds and benches, germination cabinets/germination rooms, protective structures - green/glass houses, polythene tunnels, net tunnels, combined polythene/net tunnels, growth, germination and growing rooms, cloches, cold and heated frames, outdoor cuttings beds, outdoor seed beds, 'heated bins' (garner bin), lined out rootstock beds for budding and grafting, hot-pipe grafting facilities, as applicable to activity and facilities available

Monitor for, moisture and humidity levels, ventilation, aerial and base temperatures, light levels, shade, hygiene, pests, diseases and disorders, germination and rooting.

Post-propagation stage to establishment

Watering and moisture levels, ventilation, aerial and base temperature control, humidity control, light level control, hygiene control, gaseous control (oxygen, carbon dioxide) removal of damaged, dying and decaying material, trimming and pinching back, separation – thinning, pricking out, transplanting, potting up, support, pest, disease and disorder monitoring and control

Unit 312

Manage Plant Propagation Activities

Outcome 5

Understand seed treatments and supply

Assessment Criteria

The learner can:

1. Evaluate **sources of seed and provenance**
2. Compare the **storage conditions** required for different types of seeds
3. Review **seed treatments**
 - to overcome dormancy
 - priming
 - cleaning

Unit content

Sources of seed and provenance

Seeds Act, own collected, own saved, F1, F2 and open-pollinated, viability and viability testing, pelleted, primed. Significance of provenance. Advantages and disadvantages of sources

Storage conditions

Storage conditions and length of storage for dry and recalcitrant seeds, temperatures, humidity levels, packaging

Seed treatments

Physical: thick/impermeable testa – use of physical and acid scarification, hot water treatment, Physiological dormancy: chemical inhibitors – use of water and hormone treatments, temperature controlled dormancy, moisture and temperature combined, undeveloped embryo, use of stratification/cold moist treatment Double dormancy

Multiple dormancy (hard seed coat, undeveloped embryo, cold requirement)

Priming and cleaning: examples of different methods and appropriate species

Unit 312 Manage Plant Propagation Activities

Notes for guidance

This unit requires the learner to manage plant propagation activities but should also be able to demonstrate that the relevant techniques are clearly present and have been understood.

Outcome 1 requires that the range of propagation facilities and environments as well as the physical needs of propagation material are recognised and understood. Where not all of these are present at the centre it may be advantageous to visit suitable commercial propagation units including those undertaking micro- propagation if possible to ensure that the learner gains a full appreciation of the unit content.

The development of propagation schedules can be applied to seed or vegetative propagation and should clearly take into account the requirements of the market/end-use of the plants produced, including the time at which the plant material must be available for supply. All other aspects of the propagation schedules, including sources of propagation material, growing media/site, facilities, numbers, timing and seasonality and staff expertise and availability must be considered.

For Outcome 2, the learner should be aware of the advantages and disadvantages of stock beds, bought in material, material collected from young 'plants for sale', and of plant material which is restricted for propagation or distribution due to legislation e.g. Plant Breeders Rights.

The requirements to understand and prepare suitable growing media should be referred to Outcome 3, with variations as required by the two distinct methods of propagation. In addition, the moisture and related conditions of growing media when bench grafting, should be considered. Learners must propagate plants by vegetative means covering division, cuttings, grafting and budding in sufficient quantities to develop the necessary skills and the appreciation of industrial practice. They must also be able to contribute to the establishment of propagation material.

In Outcome 3, seed sowing should cover fine and large seed, space-sown and broadcast seed and seed sown in containers and in seedbeds. Seed sowing should be by hand and/ with machinery if available and as applicable to the site and species. Those candidates who will not be using or observing seed-sowing machinery at the centre should be given the opportunity to see current seed-sowing technology in operation in a commercial or demonstration setting if possible. The learner will also carry out collection and extraction of seed and straightforward seed treatments, for at least one (1) dry seed and one (1) fleshy seed (fruit).

Seed sowing techniques to be carried out include: broadcast and space sowing in containers under protection (fine, medium and large awkward seed – one standard seed tray for each), seed sowing should be done outdoors in both 'V' shaped and flat bottomed drills (minimum length of drill should be 3m).

Outcome 4 requires that the learner is able to routinely monitor and manage a propagation facility over a period of time and ensure that the needs of the developing plants are met, the activities involved in successful weaning of the young plants will be determined by the nature of the propagation activity undertaken but should in all cases include examples of seedling and vegetatively produced young plants. Learners must also be able to actually identify the methods and describe the weaning of plants from the post-propagation stage to establishment.

Outcome 5 enables the learner to develop an understanding of dormancy and seed treatments and a combination of lectures and guided individual research will be helpful. Learners must be able to demonstrate that they understand the reasons why plants may develop seed dormancy and identify the actions necessary to overcome varied physical and physiological dormancy. Learners should also be aware of double and multiple dormancy.

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Unit 313

Manage Soil Water

Level: 3

Credit value: 5

Unit aim

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

The learner will understand the requirements for effective soil water relationships in horticultural situations and be able to maintain irrigation and drainage systems. The learner will also understand the legal requirements and codes of practice applicable to irrigation and drainage.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will be able to:

1. Understand the requirements of soil water management for horticultural use
2. Be able to maintain irrigation systems
3. Be able to install and maintain drainage systems
4. Know the legal requirements applicable to irrigation and drainage of horticultural facilities

Guided learning hours

It is recommended that **30** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L21 Maintain drainage and irrigation systems

L15.1 Install drainage systems

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 313

Manage Soil Water

Outcome 1

Understand the requirements of soil water management for horticultural use

Assessment Criteria

The learner can:

1. Analyse **factors** affecting water infiltration, penetration and drainage
2. Analyse factors affecting **loss of water** from sites and soil
3. Prepare and use a **soil water balance sheet**
4. Calculate the **drainage and irrigation** requirements of horticultural sites

Unit content

Factors

Definitions of terms: water infiltration, penetration, drainage, evapotranspiration, saturation point, field capacity, permanent and temporary wilting points, available and unavailable water, hygroscopic water, gravitational water, soil moisture deficit, evaporation and transpiration, capillary action, pore space, infiltration rate and hydraulic conductivity.

Factors affecting infiltration, penetration, drainage, evapotranspiration and the water balance: soil textures, soil structure, organic matter content, compaction, topographic, crop, climatic and environmental factors

Loss water

Factors, drainage, evaporation and transpiration (evapotranspiration): soil texture, soil structure, organic matter content, compaction, topography, crop and leaf cover, shelter/exposure, season, rainfall, temperatures and other climatic and environmental factors

Soil water balance sheet

Current data from the Meteorological Office, local climate average figures, prepare a balance sheet for an identified area, record and use weather data

Drainage and irrigation

Use standard formulae, evaluate data, estimate the drainage and irrigation requirements over a 12 month period, where to source expert advice

Unit 313

Manage Soil Water

Outcome 2

Be able to maintain irrigation systems

Assessment Criteria

The learner can:

1. Diagnose **faults and problems** with installed irrigation systems
2. Safely isolate irrigation systems prior to **repair or maintenance**
3. Carry out **routine maintenance and repair** to irrigation systems
4. Carry out the **seasonal shut-down and starting** of irrigation systems safely

Unit content

Faults and problems

Systems to include: static and mobile systems, within protective structures and outdoors, capillary beds/benches (sub-irrigation), drip irrigation, overhead systems, sprinkler systems, mist and fog units, control/sequencing equipment, pumps, pipes, tubes, filters, sprinkler heads/atomisers/nozzles
Problems may include blockages, algal growth, wet/dry areas, incorrect rate of application, wind blow, pump problems, problems associated with source, pressure, contamination, nozzle/sprinkler head faults/damage/blockage

Routine repair or maintenance

Isolation of the system, safety procedures, cleaning, replacement of nozzles, clearing blockages, dealing with leaks, mobile systems, capillary beds, fixed and automated systems

Seasonal shut down and starting

Procedures to be adopted specific to system(s), systems to include: static and mobile systems, within protective structures and outdoors, frost/cold protection/cladding, drainage of system, cleaning, filter cleaning/renewal, replacement/repair of parts, dismantling and storage

Unit 313

Manage Soil Water

Outcome 3

Be able to install and maintain drainage systems

Assessment Criteria

The learner can:

1. Describe **systems of drainage** suitable for a range of horticultural sites and uses
2. Install **pipe drainage** according to specification
3. Diagnose **faults and problems** with installed drainage systems
4. Carry out **routine maintenance or repair** to drainage systems

Unit content

Systems of drainage

The principles of land drainage

The methods, advantages and disadvantages of each of sub-soiling, open ditches, mole ploughing, pipe drainage, including silt traps and outfalls, mains, laterals and backfill

Other systems used in specific sectors of horticulture, such as sand slits in turf, sub-irrigation/drainage systems

Typical layouts, dimensions, soil types, principles of maximum, minimum and optimum falls of drains, characteristics of suitable backfill

Pipe drainage

By hand and/or machine, pipes can be tiles or plastic, installation of a sections of pipe, establishment of a fall, lay pipes, installation of soakaway, backfill materials identified/used

Faults and problems

May include: blockages to pipes, outfall, ditches, and soakaways: breakages to pipes, silt, vermin, collapse of mole channels, compaction of the soil

Routine maintenance or repair

Repairs to open ditch and piped drainage systems, clearing silt from silt traps, clearing ditches, repairing outfalls, clearing blockages

Unit 313

Manage Soil Water

Outcome 4

Know the legal requirements applicable to irrigation and drainage of horticultural facilities

Assessment Criteria

The learner can:

1. Describe the **records required** for water abstraction and drainage activities
2. Describe the **legal requirements** of irrigation and drainage of horticultural sites and facilities

Unit content

Records required

All the records required for a particular horticultural situation, hydrogeology, licence, timings/dates, quantities, abstraction/impounding licence may be required if taking 20 cubic meters plus of water (4000 gallons) per day

Legal requirements

Health and safety: environmental impact assessment, ground water, abstraction, pollution, quality and quantity adherence to current legislation and best practice

Relevant current legislation includes, Environmental Act 1995, Water Act 1965 (as amended 2003), Conservation Regulations (1994) (as amended 2007), Countryside and Rights of Way Act 2000, The Water Resources (Abstract and Impounding) Regulations 2006

Environment Agency for abstraction and impounding licence(s) (temporary/permanent), water rights trading, Department for Environment, Food and Rural Affairs (Defra), Welsh Assembly Government, Scottish Executive Environment and Rural Affairs Department (SEERAD), Department of Agriculture and Rural Affairs (Northern Ireland)

Unit 313 Manage Soil Water

Notes for guidance

This unit enables learners to develop knowledge of soil water relationships and managing the soil water balance. It also covers practical tasks relating to drainage and irrigation. It is applicable to a range of horticultural situations, such as nurseries, sport turf, parks and gardens and should be taught and assessed in the context of the learner's area of study.

Outcome 1 covers the factors involved in water movement into, within and out of the soil. Learners need to have a clear understanding of the many terms relating to soil water, the sources of water for irrigation and how to use a soil water balance sheet and estimate drainage and irrigation requirements. Learners will need access to current information from the Met Office and to local climate average figures to prepare a balance sheet for a specific area. This should be carried out over a period of time. In outdoor situations in February would be an appropriate starting point, when the soil can be deemed to be at field capacity (unless untypical weather conditions prevail). Learners should understand how soil texture and structure affect soil water balance. Learners should also be familiar with the recording of weather data. It should be possible to record some data in all centres, but a visit to appropriate site may be used to show the full range of measurements that are recorded. Learners are required to evaluate the data they have for a small and specific site and provide an estimation of the drainage and irrigation required in a typical year with average weather conditions. Learners should understand where to source expert advice.

Outcome 2 covers the maintenance, fault finding and repair of installed irrigation systems. This should be taught in the context of the learner's area of study. This should be taught as practically as possible, to help learners develop understanding and skills. Visits to look at facilities at sports venues, nurseries and gardens would also be beneficial. Environmental considerations should also be included. Manufacturers' literature and web sites are also a useful source of information for these outcomes. Learners will need to understand the equipment and layout before they can diagnose faults. Typical problems will be leaks, blockages, algal growth, wet/dry areas, incorrect rate of application, wind blow, pump problems, problems associated with source, pressure, contamination, as appropriate to the area of study. Learners should be able to repair or replace a nozzle/sprinkler head on an irrigation system and understand the construction of a capillary bed. Learners should also carry out the seasonal shut down and starting of a specified irrigation system either within a protective structure or outdoors.

Outcome 3 involves the installation and description of varied drainage systems. Learners will need to contribute to the installation of specified pipe drainage system. Pipes can be tiles or plastic pipe. Learners should be able to install a section of pipe, including one join. They should be able to establish an appropriate fall and lay pipes with a suitable backfill material. The ability to diagnose faults and problems with installed drainage systems and carry out routine maintenance or repair to drainage systems is an essential component to this outcome.

Outcome 4 covers the legal aspects of drainage and irrigation, including records required for legal or management purposes. Learners will need to demonstrate knowledge of the legal requirements applicable to irrigation and drainage systems. Learners should also demonstrate awareness of the possible need to apply for an abstraction/impound licence if taking 20 cubic meters plus of water (4000 gallons) per day from a river or stream, canal, spring or an underground source.

The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, video or DVD, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible and every opportunity should be taken to show the links to horticultural practices. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

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www.irrigationtutorials.com		Irrigation Tutorials
www.defra.gov.uk		Department for Environment, Food and
	Rural Affairs	
www.wales.gov.uk		Welsh Assembly Government
www.scotland.gov.uk		Scottish Executive Environment and Rural Affairs Department
www.dardni.gov.uk		Department of Agriculture and Rural Affairs
	(Northern Ireland)	
www.environment-agency.gov.uk		The Environment Agency www.iog.org
Institute of Groundsmanship www.bali.co.uk		British Association of Landscape Industries
www.the-gtc.co.uk		The Greenkeepers Training Committee

Unit 314

Understand the Principles of Plant Health and Protection

Level: 3

Credit value: 5

Unit aim

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

The learner will be able to identify weeds, pests, diseases and disorders within a specific industry. They will also be able to review the range of control measures viable and specify integrated control.

Learning outcomes

There are **three** learning outcomes to this unit. The learner will be able to:

1. Be able to identify pests, diseases, disorders and weeds
2. Understand problems caused by pests, diseases, disorders and weeds
3. Understand methods to deal with plant problems

Guided learning hours

It is recommended that **30** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

CU80 Plan and manage the control of pests, diseases and disorders

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 314

Understand the Principles of Plant Health and Protection

Outcome 1

Be able to identify pests, diseases, disorders and weeds

Assessment Criteria

The learner can:

1. Identify a minimum of 60 **plant problems** relating to a specific horticultural situation, which must include at least
 - 5 annual and 5 perennial weeds
 - 10 pests
 - 5 diseases
 - 5 disorders
2. Investigate and report on the plant problems **found in a specified situation**

Unit content

Plant problems

Differentiate between pests, diseases and disorders, define the term weed, differentiate between annual and perennial weeds

Identify sixty (60) plant problems: minimum of five (5) annual weeds, five (5) perennial weeds, ten (10) pests, five (5) diseases, five (5) disorders

Found in a specified situation

Ornamental bed or border (seasonal bedding, hardy, tender herbaceous perennials, evergreen, deciduous woody shrubs), grassed area (amenity, sport), nursery stock (container grown, open ground), protected cropping (pot plants, cut flower/foilage crops), aquatics (amenity, commercial)

Unit 314

Understand the Principles of Plant Health and Protection

Outcome 2

Understand problems caused by pests, diseases, disorders and weeds

Assessment Criteria

The learner can:

1. **Classify** plant problems
 - mammals, rodents and birds
 - mites, molluscs, insects and nematodes
 - fungi, viruses and bacteria
 - physiological disorders
2. Review the **life cycles, signs and damage** of the main plant problems in a specific horticultural situation
3. **Review host and pathogen relationships**
4. Explain the damage caused by **weeds and their means of spread**

Unit content

Classify

Mammals, rodents, and birds, mites, molluscs, nematodes and relevant orders of insect pests (eg *Hemiptera*, *Coleoptera*, *Lepidoptera*) groups of fungi, viruses and bacteria, types of physiological disorder

Life cycles, signs and damage

Life cycles of specific insect pests, including those with complete and incomplete metamorphosis, typical mites, molluscs and nematodes, groups of fungi, typical viruses and bacteria

Specific pests and disease examples relevant to the learner's area of study, signs, symptoms and damage, methods of control: cultural, biological (predators, parasites, fungal and bacterial agents) and chemical (contact, translocation/systemic, residual, methods of application), legislation, integrated control

Review host and pathogen relationships

Life cycle, life expectancy, season, temperature, day length, indoors, outdoors, host plant species, plant family (e.g. Brassicaceae/Cruciferae – club root), predator, parasite, fungal, bacterium, saprophyte

Weeds and their means of spread

Damage caused by weeds, means of spread (seed, rhizomes, offsets, stolons, layering, bulbs, corms, runners), habit in specific situations, appropriate control measures, cultural methods, chemical methods (contact, translocated, residual, hormone, methods of application), dispersal methods (wind, water, insects, birds, animals, tools/equipment, machinery)

Unit 314

Understand the Principles of Plant Health and Protection

Outcome 3

Understand methods to deal with plant problems

Assessment Criteria

The learner can:

1. Explain how to comply with **environmental and health and safety legislation** and codes of practice when dealing with plant problems
2. Evaluate the **control measures** available for dealing with pests, diseases, disorders and weeds
3. Evaluate **integrated management** of pests, diseases, disorders and weeds in a specific horticultural situation

Unit content

Environmental and health and safety legislation

Compliance with all relevant, current legislation, including Control of Substances Hazardous to Health (2002) (COSHH), Food and Environment Protection Act 1990 (as amended 1995) (FEPA), Control of Pesticides Regulations 1986 (COPR), Local Environment Risk Assessment for Pesticides (LERAPS), procedures, storage, disposal, use, Personal Protective Equipment (PPE), equipment, decontamination, emergency treatments, environmental assessment and protection of the environment, records required, training and qualification required

Control measures

To include cultural, chemical biological, legislation and integrated control measures, application or operational methods, modes of action, advantages and disadvantages of each, monitoring pest level, control strategies

Integrated management

Definition of integrated management with named examples, identification of likely pest/disease infestation, strategies to be adopted, available budget, health and safety implications, environmental considerations, factors affecting the general health of the plant, including nutrition and environmental factors, level of staff training, monitoring, outdoors or under protection

Unit 314 Understand the Principles of Plant Health and Protection

Notes for guidance

The learner will be able to identify weeds, pests, diseases and disorders within a specific industry. They will also be able to review the range of control measures viable and specify integrated control.

Outcome 1 covers the identification of plant problems, correct identification being the basis of control strategy. Learners should be able to confidently identify a minimum of sixty (60) plant problems. Live specimens, either growing or as classroom samples are to be preferred, but high quality images may also be used, particularly to assist learning out of the season of the problem or for problems that are not so common. The learner must be able to identify at least five (5) annual and five (5) perennial weeds, ten (10) pests, which can include insects, other invertebrates, mammals and birds, which can be identified from the pest or from the damage caused by them, five (5) diseases and five (5) disorders. These and the remainder should be appropriate to the learner's area of study, which may be sports or amenity turf, parks and gardens, nursery stock or edible crop production or other horticultural situation. Having mastered the identification the learner will investigate a specific area and report on the problems found and possible solutions. Learners will need access to live specimens and reference material to practise identification.

Outcome 2 covers the classification of plant problems (relating to mammals, rodents, birds, mites, molluscs, insects, nematodes, fungi, viruses and bacteria, inclusive of physiological disorders). Learners must review life cycles and the relationships between host and pathogen. Learners will need access to reference material for this outcome, and tutors may find a combination of formal delivery, inspection of plant material/crops and individual learner study a useful approach. Learners must be able to distinguish between physiological disorders, pests and diseases naming examples and recognising their signs, symptoms and damage to plant material (above or below ground). Learners will also need to recognise and explain the damage caused by weeds and their varied means of spread and dispersal.

Outcome 3 deals with strategies to control plant problems and integrated management. It also covers the legal and environmental aspects of dealing with plant problems. Learners do not have to use chemicals to complete this unit, but if they do so they must comply with pesticide application legislation, and hold the relevant qualification. Learners will need to consider all the available methods of dealing with plant problems individually, and then consider them in relation to a specific area, identify actual and potential problems, carry out an environmental assessment and devise an integrated management strategy for the area. This task is likely to take a considerable amount of time, and learners will need access to current data, particularly of biological and chemical controls. Learners should review integrated pest management in the context of one (1) situation or crop.

The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, experimentation, investigations using microscope slides and sections, discussions, video or DVD, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible and every opportunity should be taken to show the link to horticultural practices. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

Unit 314

Understand the Principles of Plant Health and Protection

Outcome 3

Understand methods to deal with plant problems

Books

- Brickell, C. 2007. *RHS Encyclopaedia of Gardening*. 3rd ed. Harlow: Dorling Kindersley Publishing.
- Buczacki, S. 1989. *Collins Guide to the Pests, Diseases and Disorders of Garden Plants*. Hammersmith: Harper Collins.
- FBC Limited. 1975. *Broad-leaved weeds, a guide to identification*. Nottingham: FBC Limited.
- Halstead, A., Greenwood, P. 2009. *RHS Pests and Diseases*. Harlow: Dorling Kindersley.
- Hubbard, C.E. 1992. *Grasses: v. 1: A Guide to Their Structure, Identification, Uses and Distribution*. 3rd ed. London: Penguin Books.
- Ingram, D.S. et al. 2008. *Science and the Garden: The Scientific Basis of Horticultural Practice*. 2nd ed. Sussex: Wiley Publishing.
- Lainsbury, M. 2009. *UK Pesticide Guide 2009*. Oxford: CABI Publishing.
- Phillips, R. 1977. *Wild flowers of Britain*. London: Pan Books.
- Chancellor, R.J. 1981. *The Identification of Weed Seedlings of Farm and Garden*. Sussex: Wiley Publishing.
- Clapham et al. 1987. *Flora of the British Isles*. Cambridge: Cambridge University Press.

Health and Safety Executive Codes of Practice Leaflets

Websites

www.rhs.org.uk	The Royal Horticultural Society
www.bcpc.org	British Crop Production Council
www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.wales.gov.uk	Welsh Assembly Government
www.scotland.gov.uk	Scottish Executive Environment and Rural Affairs Department
www.dardni.gov.uk	Department of Agriculture and Rural Affairs (Northern Ireland)

Unit 315

Understand the Principles of Organic Crop Production

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to develop knowledge of the principles of organic crop production methods. They will cover the philosophy behind organic crop production and growing systems employed in them.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will be able to:

1. Understand the principles of organic crop production
2. Understand the importance of soil fertility in an organic system
3. Understand growing methods and markets for organic crops
4. Understand methods of pest, disease and weed management in organic systems

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 315

Understand the Principles of Organic Crop Production

Outcome 1

Understand the principles of organic crop production

Assessment Criteria

The learner can:

1. Review the **history, philosophy and aims** of the organic movement
2. Examine the **roles** of the Soil Association and other organisations within the organic movement
3. Summarise **systems** related to organic production, biodynamics, agroforestry and permaculture
4. Explain **organic standards** and certification

Unit content

History, philosophy and aims

Historical relevance of ancient and traditional agricultural and horticultural practice Organisational influences e.g. The Soil Association, Garden Organic (formerly HDRA). The influence of individuals e.g. Sir Albert Howard, Eve Balfour, Lawrence D Hills, HRH Prince Charles

The law of return (Howard), the importance of underlying scientific principles, characteristics of organic systems, the consequences of artificial chemical use in non-organic crop production

Roles

The Soil Association aims and role, educational programmes and campaigns, better school food, opposing genetic modification (GM), the use of antibiotics and pesticides. promotion of organic farming, food security, certification and maintaining organic standards, partnerships (Focus on Food, Health Education Trust, Garden Organic, Land Trust), support, technical support, practical advice, market information and development, hosting of the Organic Farm Network, Community Supported Agriculture Scheme, other organisations e.g. Garden Organic, Organic Trades Association

Systems

Three main movements/philosophies/systems, (permaculture movement, bio-dynamic movement, agro-forestry movement), benefits, uses and advantages, techniques (also the 'no dig', growing technique)

Organic standards

Advisory Committee on Organic standards (ACOS)

The Soil Association

European Union (EU)

Unit 315

Understand the Principles of Organic Crop Production

Outcome 2

Understand the importance of soil fertility in an organic system

Assessment Criteria

The learner can:

1. Explain the concept of **'The living soil'** including its physical, chemical and biological components
2. Explain the causes of **soil erosion** and preventative measures that can be taken
3. Review **soil fertility** and describe how it can be built up and maintained
4. Describe the **process of conversion** of a site to organic production

Unit content

'The living soil'

Importance of analysis, soil structure, soil texture and fertility

Humus, decomposition of organic material by primary and secondary decomposers

The action of macro, meso and micro soil organisms, earthworms, protozoa, bacteria-feeding nematodes, mycorrhiza

Non biological soil reactions

Soil erosion

Causes, climatic conditions, cultivation, preventative measures and soil conservation, wind reduction, terracing, minimal tillage/no tillage, contour cultivation, mulches and fabrics, surface consolidation, cover crops, green manures

Soil fertility

Cultivation, crop rotation, intercropping, rooting depths, provision of organic matter, composts, mulches and supplemental nutrition, creation of ideal conditions (carbon, nitrogen, nitrogen fixers, fertility builders, rhizobia, aerobic and anaerobic bacterium), types of composting systems, soil improvers (animal manures, green manures, worm products)

Process of conversion

The Soil Association (Certification Limited), most recognised organic trade mark, usually two year conversion (three if for perennial crops (build fertility, adapt production methods), steps to certification/conversion 1) application 2) inspection 3) certification

Registration procedures, conversion, timing, inspection, derogation, record keeping, labelling regulations, organic seeds and plants, past crop records (including feed and chemical applications), size of holding, crops grown, date for organic production, current and future crop records kept to demonstrate compliance with organic standards, approved organic inputs, Organic Farmers and Growers

Unit 315

Understand the Principles of Organic Crop Production

Outcome 3

Understand growing methods and markets for organic crops

Assessment Criteria

The learner can:

1. Explain the growing methods for **organic crops**, including root, leafy, bulb and leguminous vegetables, soft and top fruits
2. Explain the **sourcing of seeds and material inputs** for organic systems
3. Review the **markets** available for organic produce
4. Explain the **management of marketing** organic crops

Unit content

Organic crops

Adherence to relevant legislation and codes of practice, organic standards, quality standards, health and safety, Personal Protective Equipment (PPE), food integrity and food safety

Methods for a selection of crops e.g. roots, brassicas, alliums, cucurbits, salads, top fruit, cane fruit and soft fruit, types, species, varieties, seed, modules, transplants

Care of the crop: irrigation, training, pruning (as appropriate), provision of support (as appropriate), weed control, pest and disease control

Harvest and storage requirements

Sourcing of seeds and material inputs

Approved organic inputs, certified inputs, use of derogation in certain circumstances where certified inputs are not available, other suitable ethical sources. COSI Centre for organic seed information, Heritage seed scheme for vegetables

Markets

The supply chain: packers, co-operatives, wholesalers, distributors, supermarkets, community-supported agriculture (CSA), farm shops, retailers

Direct marketing, box schemes, farmers' and community markets

Management of marketing

Business planning and development, marketing strategy, economic considerations, identification of business opportunities, proximity to markets

Facilities, machinery, equipment, labour, materials, transport, packaging, presentation, point of sale materials, processing customer requirements customer led demand for produce, crop types

Approval to use recognised organic food symbol e.g. the Soil Association Organic Symbol (recognised trade mark)

Unit 315

Understand the Principles of Organic Crop

Outcome 4

Understand methods of pest, disease and weed management in organic systems

Assessment Criteria

The learner can:

1. Summarise **pest and disease management** in organic systems
2. Review **weed control** strategies
3. Explain the benefits and limitations of a **diverse ecology** and how this may be developed

Unit content

Pest and disease management

Balance of damage caused against the impact of control measures

The importance of biodiversity, preferred habitats of beneficial, predators, parasites, bacterium and fungal agents, insects, organisms and their lifecycles

Issues surrounding monocultural environments, crop rotation, variety selection and the right plant/right place

Control measures, cultural, biological, permissible biocides, companion planting, use of green manures, the use of indicators and distracters

Methods of pest and disease and disorder management to cover that for use in protective structures and outdoors

Weed control

Identification of major perennial, annual and ephemeral weed species, the value of weeds as indicator species in respect of soil characteristics, quality and nutrient availability

Methods of control: crop rotation, tillage, direct control, mulching, cultural, exhaustion, thermal, mechanical and manual

Cultivation techniques: stale seed bed, technique, and double/single digging/no dig

Grassed areas: identification of broad leaved and grass species (annual/perennial), scarification, mowing regimes, mechanical and manual

Diverse ecology

Relevant legislation and codes of practice, environmental grants

Habitat diversity, habitat development, maintenance and enhancement

Mixed plantings rather than monocultures, working with natural systems to build a well balanced fertile soil, use of bulky organic materials to improve soil structure and nutrient recycling by micro-organisms, minimum reliance on outside inputs, avoidance of chemically produced and environmentally harmful fertilisers and pesticides, encouraging natural balance of predators, such as ladybirds, lacewings, blue tits and hedgehogs, avoidance of genetically modified material (GMO's), waste management (reduce, re-use, recycle)

Unit 315 Understand the Principles of Organic Crop

Notes for guidance

The learner will be able to understand the underlying principles of organic crop production, the importance of soil fertility and nutrition. They will gain an appreciation and understanding of methods of soil cultivation, sowing, planting and mechanical weed control organic production systems. Learners will understand growing methods and methods of pest, disease and weed management in organic systems. Finally learners will develop an understanding of the markets for organically grown produce.

In Outcome 1, learners will develop their understanding of organics by reviewing the history and aims of the organic movement, the key people involved. They will evaluate the role of the soil association and other organisations. They will summarise systems related to organic production including permaculture, biodynamics and agro forestry.

The final section of the outcome requires the learner's to be able explain organic standards and certification. Reference to The International Federation of Organic Movements (IFOAM), Advisory Committee on Organic Standards (ACOS) the Soil Association and the role of the European Union (EU) should be made.

In Outcome 2, learners will develop their knowledge of soils in organic system of production. They will be able to explain the concept of 'the living soil', the causes of soil erosion and the preventative measure that can be taken. Learners will also be able to review aspects of soil fertility, how it can be built up and maintained together with methods of providing additional nutrition to growing crops. Learners must also be able to describe the process of conversion of a site to organic production and know the organisation involved.

In Outcome 3, learners will develop an understanding of organic crop production methods and the varied market outlets for organic produce. Edible crops production methods must cover a minimum of two (2) plant types belonging to each of the following groups: root, leafy, bulb and leguminous vegetables, soft and top fruits. Learners will also need to identify and explain the sourcing of seeds and material inputs for organic systems and explain the management of marketing process for organic produce.

In Outcome 4, learners will be able to explain the benefits and limitations of a diverse ecology and how this might be developed. They will be able to summarise pest, disease and weed control in organic systems. In order to meet this outcome, learners will need to have access to specialist learning resources. It would be useful for learners to visit an organic enterprise to discuss some of the aspects covered by this outcome. When reviewing pest control methods particular attention should be given to the use of biological control agents (within protective structures and outdoors). Learners should appreciate the benefits and limitations of each control method and be able to identify a range of biological control agents.

The unit may be delivered by a wide range of techniques, including lectures, video or DVD use, supervised practical work, discussions, identification of pests, diseases, disorders, biological control agents and weed, site visits and research. Learners will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible and every opportunity should be taken to show the link to horticultural practices All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

References

Books

- Blake, F. 1994 *Organic Farming and Growing: A Guide to Management*. The Crowood Press
- Davies, G. & Lennartsson, M. 2006 *Organic Vegetable Production: A complete Guide*. The Crowood Press
- Mollison, B. & Slay, R. 1994 *Introduction to Permaculture*, 2ND Edition. Tagari Publications
- HDRA, 2005 *Encyclopaedia of Organic Gardening*. Dorling Kindersley Readman,
- J. 2004 *Managing Soil Without Using Chemicals*. Dorling Kindersley
- Pears, P. & Stickland, S. 1999 *RHS Organic Gardening*
- Pears, P. & Sherwood, B *Pests and How to Control Them*
- Greenwood, P. & Halstead, A. *RHS Pest & Diseases*. Dorling Kindersley
- Littlewood, M. 2007 *Organic Gardener's handbook*. Dorling Kindersley
- Littlewood, M. *Companion Planting Chart*. Garden Organic
- Garden Organic fact sheets: *Disease Control, Pest Control, Weed Control*

Journals

The Living Earth
Organic Farming
The Organic Way
Permaculture Magazine

Websites

www.soilassociation.org	Soil Association
www.gardenorganic.org.uk	Garden Organic
www.rhs.org.uk	Royal Horticultural Society
www.biodynamics.or.uk	Biodynamic Agricultural Association
www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.wales.gov.uk	Welsh Assembly Government
www.scotland.gov.uk	Scottish Executive Environment and Rural Affairs Department
www.dardni.gov.uk	Department of Agriculture and Rural Affairs (Northern Ireland)

Unit 316

Understand the Principles of Sustainable Development

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to develop knowledge of the complex issues surrounding sustainable development strategies and the significance of these to future generations.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will be able to:

1. Understand the principles of sustainable development
2. Understand resource and environmental management in relation to sustainable development
3. Know how economics and society contribute to sustainable development
4. Understand methods in use to implement sustainable development

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 316

Understand the Principles of Sustainable Development

Outcome 1

Understand the principles of sustainable development

Assessment Criteria

The learner can:

1. Define the **concept of sustainable development**
2. Review the Gaia hypothesis and the **human, evolutionary and global issues** that impact on sustainability
3. Summarise the **global conventions and protocols** related to sustainable development
4. Review **methods** used globally to encourage countries to agree a sustainable policy

Unit content

Concept of sustainable development

Term came to prominence in 1987, United Nations (UN), World Commission on Environmental Development (the Brundtland Commission), report produced entitled “Our Common Future”

Many definitions, interpretations, understandings: radical focus towards organisation of social, economic and political life or simply economic growth linked to social and environmental progress, living within environmental limits

Main focus on: environment, society, economy, balancing the needs of the present with the future

Human, evolutionary and global issues

Gaia hypothesis “an ecological hypothesis proposing that the biosphere and the physical components of the Earth (atmosphere, cryosphere, hydrosphere and lithosphere) are closely integrated to form a complex interacting system that maintains the climatic and biogeochemical conditions on Earth in a preferred homeostasis”.

Human population growth, agricultural development, industrial development, resource consumption and pollution local and global transport systems

Global conventions and protocols

International convention protocols, legislation and the methods used to ensure countries adhere to agreed principles, United Nations Earth Summit, Rio de Janeiro, Agenda 21, 1992 a commitment to sustainable development focusing on conservation and preservation, United Nations Climate Change Convention, Kyoto Protocol 1997, United Nations Copenhagen Conference 2009

Methods

Political (local, national and international), general public and independent pressure groups, consumers, growers/producers, food industry, Governmental watchdogs

National and International governmental guidance, protocols, legislation, summits (UN)

Agenda 21, 1992 a commitment to sustainable development focusing on conservation and preservation

Unit 316

Understand the Principles of Sustainable Development

Outcome 2

Understand resource and environmental management in relation to sustainable development

Assessment Criteria

The learner can:

1. Review **environmental systems** impacting on plant and animal life, including food webs, water and nutrient cycles, population dynamics, use of resources
2. Evaluate the effects of **human activities on the environment**
3. Evaluate the **integration of sustainable development** in agriculture, fisheries and forestry

Unit content

Environmental systems

The essential requirements for plant and animal life e.g. air, water, sunlight, space biological cycles to include: hydrological cycle, Carbon cycle, Nitrogen cycle

Population dynamics: food webs, predator/prey relationships, use of resources, finite and renewable

Human activities on the environment

Pollution, use and where possible renewal of natural resources e.g. timber

catastrophic and gradual climate change, increase in carbon dioxide levels: exhaustion of natural resources, sustaining biological diversity (biodiversity, current problems affecting biodiversity e.g. habitat destruction, pollution, invasion of alien (feral) species, biodiversity initiatives e.g. UK Biodiversity Action Plan and the ability of an ecosystem to sustain diversity

Integration of sustainable development

Issues relating to feeding burgeoning populations, sustainable farming methods, genetic plant diversity (crops), issues facing forests e.g. deforestation, logging, agricultural expansion, overgrazing, sustainable forestry e.g. economic preservation of local inhabitants, provision of wildlife refuges, marine and freshwater population, overfishing of wild stocks, sustainable aquaculture e.g. choice of species to provide fish protein for human consumption, development of new sources

Unit 316

Understand the Principles of Sustainable Development

Outcome 3

Know how economics and society contribute to sustainable development

Assessment Criteria

The learner can:

1. Explain how sustainable development is affected by **investment, competition and stability**
2. Explain the **rights and responsibilities of the citizen**
3. Discuss the difference between **'standard of living' and 'quality of life'**
4. Explain how the behaviour of one generation **impacts** on the environment for future generations

Unit content

Investment, competition and stability

Importance of education and learning, the development of skills, environmental awareness and protection, cultural competitiveness, entrepreneurialism, innovation, technological advancement, the availability of financial, physical and human resources, the effects of economic stability and growth, adoption and awareness of concepts (eco-footprint, carbon footprinting, eco-efficiency, recycling, interdependence and "*preferable futures*", what man works for and hopes to create, based on hopes, aspirations and dreams

Rights and responsibilities of the citizen

Participation of the global, National and local community to achieve a more sustainable lifestyle, the responsibility of government, businesses, colleges, schools, households and individuals towards the goal of sustainable development (sustainable future)

'Standard of living' and 'quality of life'

Difference between 'standard of living' and 'quality of life', the global or local factors that influence or affect the quality of life, the link between action taken (today) and impact on the environment, the drivers of consumerism and personal choice

Impacts

Methods of reducing impacts on the environment, use of natural resources, reasons and benefits for restraint, why it is necessary and why it matters

Unit 316 Understand the Principles of Sustainable Development

Outcome 4 Understand methods in use to implement sustainable development

Assessment Criteria

The learner can:

1. Summarise **Agenda 21**
2. Evaluate the introduction of **sustainable development strategies**

Unit content

Agenda 21

United Nations Earth Summit, Rio de Janeiro, Agenda 21,1992 a commitment to sustainable development focusing on conservation and preservation

The blueprint for sustainability in the 21st Century, local and regional promotion, the development of societies and economies, conservation and preservation of the environment and natural resources, local Agenda 21 community involvement, vision statements, action plans and methods of implementation

Sustainable development strategies

A global issue, United Nations' Commission on Sustainable Development, UK Sustainable Development Commission, the creation of a national strategy, the UK Government sustainable Development strategy e.g. guiding principles, agreed priorities, indicators of success

Unit 316

Understand the Principles of Sustainable Development

Notes for guidance

The learner will understand the principles of sustainable development, resource use and environmental management. They will know how economics and society contribute to sustainable development and the methods used to implement sustainable development.

In Outcome 1 learners will define the concept of sustainable development and review the Gaia hypothesis and examine the human, evolutionary and global issues that impact on sustainability. They will also be able to summarise the global conventions and protocols related to sustainable development and review the methods used globally to encourage countries to agree policy. This should be supported by lectures providing underpinning knowledge. Learners should be encouraged to discuss the concepts and issues and consider sustainable development.

In Outcome 2 learners will be able to review environmental systems that impact upon plant and animal life and evaluate the effects of human activities on the environment. They will also evaluate the integration of sustainable development in agriculture, fisheries and forestry and the ability of humans to sustain life. This outcome could be supported by off site visits to specialist resources eg The Sustainability Centre.

In Outcome 3 learners will be able to explain how sustainable development is affected by a number of factors. They will be able to explain the rights and responsibilities of a citizen in a global and local context. Learners will develop an understanding of socio-economic factors and discuss the difference between the terms 'standard of living' and 'quality of life' and explain how the behaviour of one generation impacts on the environment for future generations. This outcome could be supported by specialist lecturers delivering underpinning knowledge and off site visits to specialist resources.

In Outcome 4 learners will be able to summarise Agenda 21 and evaluate a number of International and National sustainable development strategies. Learners should be encouraged to keep up to date with local, National and International developments and strategies, via local and national press, radio/TV news/documentaries, industry journals and research/reports.

The unit may be delivered by a wide range of techniques, including lectures, video or DVD, supervised practical work, discussions, learner presentations, guest speakers, site visits and research. Learners will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to off site visits and practical activities.

References

Books

Blake, F. 1994 Organic Farming and Growing: A Guide to Management. The Crowood Press

Websites

www.soilassociation.org
www.gardenorganic.org.uk
www.rhs.org.uk
www.biodynamics.or.uk
www.defra.gov.uk
www.wales.gov.uk
www.scotland.gov.uk
www.dardni.gov.uk
www.unric.org

Soil Association
Garden Organic
Royal Horticultural Society
Biodynamic Agricultural association
Department for Food, Environment and Rural Affairs
Welsh Assembly Government
Scottish Executive Environment and Rural Affairs Department
Department of Agriculture and Rural Affairs (Northern Ireland)
United Nations Regional Information Centre

Unit 317

Construct and Maintain Decorative Landscape Features

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to develop the skills and knowledge to construct and maintain specialist landscape features, including rock and alpine features, ponds and water features and climbing and wall plants.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will be able to:

1. Be able to construct and maintain rock and water features
2. Understand the construction of rock and alpine features
3. Understand the construction and maintenance of ponds and water features
4. Be able establish and maintain climbing and wall plants

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L24.4 Construct pools and water features

L24.5 Construct rock gardens

CU20 Maintain and repair structures and surfaces

CU21 Construct new structures and surfaces

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 317

Construct and Maintain Decorative Landscape Features

Outcome 1

Be able to construct and maintain rock and water features

Assessment Criteria

The learner can:

1. Design and construct **rock garden features safely**
2. Identify and select **appropriate plants** and install them in alpine and water features
3. Install a **small pool or water feature** safely
4. Maintain **rock and water features** and their plants

Unit content

Rock garden features safely

Safe construction, arrangement of rocks, pattern, alignment, strata, keystones, formation of planting pockets, other alpine features, sloping features, screed beds, raised beds, alpine sinks/troughs, rock sculptures: position of alpine features, aspect, and sunlight, health and safety requirements

Choice of rock (sedimentary, metamorphic, igneous, limestone, millstone grit, sandstone, slate, tufa, granite, artificial, hypertufa, gravels, aggregates, concrete), size of rock given the situation to be constructed and to meet given application

Appropriate plants

Learners should be able to select suitable plants for the feature in regard to soil, pH, size, and budget
Evergreen, coniferous, herbaceous, cushion habit, creeping habit, bulbs, aquatic, oxygenators, depth, habitats, dry, vertical, sloping, horizontal, wet, marginal, shade, full sun

Small pool or water feature

Learners should be able to install a small pool or water feature safely. This may include installation of a pump, as in a pebble fountain, but **does not include connection to the electricity supply**

Pond considerations: depths, surface area, edge accessibility and egress, formal and informal, hidden edges, merged edges, raised edges, siting of ponds and water features

Feature considerations: pre-formed e.g. polyurethane, constructed on site, lined with butyl, constructed of rock and concrete/mortar, pebble features, millstones (real, artificial) and other drilled rock features, bubble fountains

Rock and water features

Routine/safe maintenance: weed control, topping up mulch organic/inorganic, cutting back, dead-heading, gapping up, division and replanting of water plants, dealing with green water, removal of leaves and debris

Unit 317

Construct and Maintain Decorative Landscape Features

Outcome 2

Understand the construction of rock and alpine features

Assessment Criteria

The learner can:

1. Explain the **principles of rock garden construction**, including placement of stones, rock garden features, tools and equipment and the related health and safety considerations add environmental impacts and waste disposal
2. Evaluate the **types of rock available**, their characteristics and appropriate uses and the positive and negative **environmental impacts** of their use
3. Describe **typical problems** that may be encountered in the construction of rock gardens and methods to overcome them
4. Describe the characteristics of **growing media** for rock gardens and rock garden features

Unit content

Principles of rock garden construction

Siting of a rock garden, aspect, lack of shade, types of rock garden and alpine feature, tools and equipment, health and safety, access routes and transportation of rock

Placement of rocks: start at base and work upwards, lines of strata, setting key stones, outcrops on flat and sloping ground, rock pockets and terraces, scree and moraines, gullies and cascades, boulders and standing rocks, steps and pavements, erratic in alpine meadows

Practical work activities take place at the correct time of year and in the appropriate weather conditions, undertake environmental impact assessment, correct removal and disposal of debris/waste, ensure efficient use of materials, avoids wastage

Types of rock available, environmental impacts: growing media

Rock characteristics/uses, sedimentary: metamorphic, igneous, limestone, millstone grit, sandstone, slate, tufa, granite, artificial: hypertufa, gravels, aggregates, concrete, Environmental impact, quarrying, habitat loss and creation, transportation costs and impact, use of peat, disposal of arisings, sourcing of alpine plants Selection and characteristics of growing media for rock gardens, scree and troughs

Typical problems

Weeds, vigorous, invasive and delicate species planted together, erosion, shade, pests/diseases/disorders, irrigation

Unit 317

Construct and Maintain Decorative Landscape Features

Outcome 3

Understand the construction and maintenance of ponds and water features

Assessment Criteria

The learner can:

1. Review the **types of pond and water feature** in use including
 - the characteristics of sites for which they are suitable
 - the requirements of a suitable pond environment for aquatic plant and animal species
2. Describe the safe **construction of ponds and water features**, including resource estimation, materials, tools and equipment, access routes and levels
3. Explain the principles of **selecting and positioning pumps, fountains and cascades** and the safety issues relating to these
4. Describe the **seasonal, annual and long-term maintenance requirement** of water features

Unit content

Types of pond and water feature

Characteristics of water features and sites for which they are appropriate, formal, informal ponds, wildlife ponds, pebble fountains, millstones, streams, cascades and fountains. Providing a balanced ecosystem for aquatic plants and animals, surface area in relation to depth, volume of water, provision of planting shelves, specific heat capacity of water- overheating and freezing problems, correct nutrient balance and eutrophication problems, inclusion of fish

Construction of ponds and water features

Health and safety issues, Personal Protective Equipment (PPE), access routes and transportation, tools and equipment, construction materials (rigid fibre-glass/plastic, butyl rubber/UV stabilised PVC, concrete, polythene and other films, puddle and bentonite clay) and construction techniques, including establishing a level

Practical work activities take place at the correct time of year and in the appropriate weather conditions, undertake environmental impact assessment, correct removal and disposal of debris/waste, ensure efficient use of materials, avoids wastage

Selecting and positioning pumps, fountains and cascades

Principles involved in selection and installation and relevant safety issues, pump power selection and positioning, the effects of pipe dimension on flow

Pumps (submersible, external, solar), pipe-work, filters, electrical requirements **does not include connection to the electricity supply**, fittings and connections: water proofing agents

Seasonal, annual and long-term maintenance requirement

Dealing with algae and green water, maintaining water levels, keeping some the surface ice-free, preventing leaves falling into/removal of leaves, protection from predators, cats, herons: division/re-potting of plants, ensuring presence of oxygenators, removal of debris, repairs to the fabric of the pond

Unit 317

Construct and Maintain Decorative Landscape Features

Outcome 4

Be able establish and maintain climbing and wall plants

Assessment Criteria

The learner can:

1. Identify **climbing and wall plants** and select suitable plants for location and aspect
2. **Install a structure** or support and **plant climbing or wall plants**
3. Evaluate the **types of support** and materials available for climbing plants
4. Explain **the annual maintenance** of climbing and wall plants and their supports

Unit content

Climbing and wall plants

Differentiate between climbers and wall shrubs, selection of plants suitable for aspect, soil type and conditions and local climate, plants for interest through out the year (flower, fruit, foliage colour, deciduous, evergreen, habit), plants self-supporting and plants requiring a support

Install a structure: plant climbing or wall plants

Learners should be able to securely erect a support and plant appropriate plants, select materials/method of support (e.g. trellis, timber laths, pergola, wire, ties, wall nails)

Types of support

May be timber, stone and cement-bound reconstituted stone, carbon fibre or plastic/recycled plastic materials, assessing material for quality, pergolas, trellis, archways, arbours: construction methods for each, tools and equipment required, environmental and legal issues, access routes and transportation, potential problems and ways to overcome them

The annual maintenance

How to protect structures and materials, effects of moisture on materials, timber preservation, benefits and effects of paints, frost protection of structure, timing and frequency of application: inspection, annual and long-term maintenance, including repair and renovation

Annual maintenance of climbing plants and wall shrubs inclusive of dead heading, training to shape, tying in, pruning (to shape, for flower/fruit, size, removal of dead, diseased and dying growth), feeding/top dressing, mulching, irrigation, frost protection for tender plants

Unit 317 Construct and Maintain Decorative Landscape Features

Notes for guidance

This unit is designed to equip learners with the knowledge and skills required to construct and renovate specialist landscape features including rock gardens and alpine features, ponds and structures for climbers and wall shrubs. It includes the installation of the feature, the planting and the maintenance.

In Outcome 1, learners will develop skill in the design, installation/construction and maintenance of rock and water features and the identification, selection and establishment of suitable plants. Learners will require suitable facilities for practical work. Health and safety issues need to be reinforced in particular manual and mechanical materials handling and working safely with other people. They will need access to literature, catalogues and the internet for research into specifications and suitable plants. Learners must be able to identify a minimum of ten (10) plants suitable for rock garden features and five (5) aquatic plants, by their full botanical names.

In Outcome 2, learners will develop an understanding of rock gardens and associated alpine features, including types of rock, environmental impacts, typical problems and growing media requirements and characteristics. They must be able to explain the principles of rock garden construction, including placement of rocks, rock garden features, tools/equipment and the health and safety requirements. Learners will need to demonstrate their ability to identify and evaluate the rock types available, their characteristics with reference to their uses, carrying out an environmental impact assessment of their use.

In Outcome 3, learners will develop an understanding of ponds and water features. For both of these outcomes, a combination of lectures, guided individual research and visits would be beneficial. Related health and safety issues must be highlighted, including handling of materials and electrical safety. Learners will need to review the different types of ponds and water features and describe their safe construction with reference to materials, tools and equipment, access routes, levels, selection and positioning of pumps, fountains and cascades, together with explaining the positive and negative environmental impacts of construction. Finally learners must also be enabled to identify and describe the seasonal, annual and long-term maintenance requirements of water features.

In Outcome 4, learners will develop knowledge and skills associated with climbers and wall shrubs. They will need access to suitable facilities to practise the erection of supports, planting and maintenance. Learners must identify ten (10) climbing plants and ten (10) wall shrubs by their full botanical names and be able to state the plants preferred planting position and aspect. They must contribute to the installation of a structure or support and plant a selection of climbing or wall plants (minimum of three (3) plants for each), evaluate the types of support and materials available for climbing plants and identify and explain the annual maintenance of climbing and wall plants (inclusive of pruning) and their supports.

The unit may be delivered by a wide range of techniques, including lectures, video or DVD, supervised practical work, discussions, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities and learners should not be asked to undertake physical tasks beyond their physical capabilities. The identification of hard and soft landscaping materials is an essential part of this unit.

References

Books

Adams, C.R., Early, M.P. 2004. *Principles of Horticulture* . Oxford: Butterworth-Heineman.

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Hillier Nurseries. 1998. *The Hillier Manual of Trees and Shrubs*. 7th ed. Devon: David and Charles.

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www.rhs.org.uk

The Royal Horticultural Society

Unit 318

Establish and Manage Exterior Plant Displays

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to develop the skills and knowledge to be able to plan and establish annual, herbaceous and woody plants in ornamental, outdoor displays, including hedges, roses and the use of containers. The learner will also explore the use of colour, form and texture in ornamental displays and be able to schedule the maintenance of displays.

Learning outcomes

There are **five** learning outcomes to this unit. The learner will:

1. Be able to plan and establish annual and herbaceous plant displays outdoors
2. Be able to plan, establish and maintain plants in outdoor containers
3. Understand the selection and use of plants in temporary and permanent outdoor displays
4. Understand the establishment and maintenance of rose gardens
5. Be able to manage the establishment and maintenance of trees and shrubs

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L19.4 Establish planted areas

L22.1 Plan and ensure the maintenance of planted areas

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 318

Establish and Manage Exterior Plant Displays

Outcome 1

Be able to plan and establish annual and herbaceous plant displays outdoors

Assessment Criteria

The learner can:

1. Assess the **site suitability and requirements** and select suitable plants
2. Prepare **plans** of bedding displays and herbaceous borders
3. **Establish and maintain** annual and herbaceous ornamental plants on outdoor sites safely

Unit content

Site suitability and requirements

Aspect, slope, size, shade, exposure, altitude, latitude, shelter, pH, drainage, rainfall, soil texture and structure, access, public/private viewing and use, freedom from perennial weeds Identification/election of plants

Plans

Sketch plans, detailed planting plans to scale (conventional plan layout), for spring and summer bedding borders (use of edging, ground work, dot plants, bulbs), 'one-sided' and island herbaceous beds, plant positioning, planting distances, plant quantities

Establish and maintain

Primary and secondary ground cultivations, application of base/top dressing, planting (position, spacing, depth, firming, irrigation), gapping up, provision of support, pest, disease, disorder monitoring and control, weed control (hoeing, hand weeding, mulching), thinning, gapping-up, irrigation, cutting back, and removal, maintenance of edges if set in grass, all as relevant to either/both of annual and herbaceous borders

Unit 318

Establish and Manage Exterior Plant Displays

Outcome 2

Be able to plan, establish and maintain plants in outdoor containers

Assessment Criteria

The learner can:

1. **Plan** temporary and permanent displays in outdoor containers
2. Establish suitable plants for **temporary and permanent display** in outdoor containers safely
3. **Specify the maintenance** of plants in containers

Unit content

Plan

Sketch and detailed plans to scale, plans for urban public displays and private garden use, plant selection, plant numbers, container type (material, dimensions, liner), growing media, plant supports

Temporary and permanent displays

Hanging basket displays, single and multiple planter, window boxes/troughs, displays for summer and winter use, in public and private locations, permanent container displays of perennials in public and private locations
Planting in appropriate season and weather conditions, plant type, planting depth, position, firming, irrigation, growing media, water retention materials, nutritional levels/feeding

Specify the maintenance

Watering, feeding, dead-heading, pruning, plant replacement, support, mulching, pest, disease and disorder monitoring and control, site cleaning in public areas, all as applicable to the container type, plants displayed and location

Unit 318

Establish and Manage Exterior Plant Displays

Outcome 3

Understand the selection and use of plants in temporary and permanent outdoor displays

Assessment Criteria

The learner can:

1. Evaluate the **growing media** requirements for plants in outdoor beds and containers
2. Review the types and preparation of **containers** for outdoor displays
3. Explore the use of **colour, texture and form** in outdoor beds and containers

Unit content

Growing media

Soil, loam-based, peat-based, peat substitute based, artificial, drainage, moisture retentive, pH, nutritional status, freedom from pests, diseases, weeds and pollutants

Containers

Hanging baskets/pots, planters, 'self-watering' containers with reservoirs, plastic, plastic coated wire, wood, pot, terracotta, fibreglass, lead, stone, concrete, metals, containers for temporary and permanent displays

Colour, texture and form

Use of colour and colour wheels: flower, foliage, harmonies, contrasts, tone, shade, warm, cool, themed, approaching, receding, mood

Texture: rough, smooth, coarse, glossy, sharp, hard, soft, contrasts and harmonies of texture

Form: upright, weeping, columnar, broad, round, conical, dense, open, trailing/arching, prostrate, contrasts and harmonies of form

Unit 318

Establish and Manage Exterior Plant Displays

Outcome 4

Understand the establishment and maintenance of rose gardens

Assessment Criteria

The learner can:

1. Review the **types of roses** available, their decorative features, uses and requirements
2. Evaluate the **use of roses** in rose gardens and in combination with other plants

Unit content

Types of roses

Large-flowered, cluster-flowered, miniature, bush, standard, standard weeping, ground-cover, climber, rambler, shrub, hedging, old-fashioned, modern, budded and cuttings-propagated

Use of roses

Evaluation: rose type, position/aspect, soil requirements, function, pruning requirements, disease resistant varieties/cultivars, single specimens, mixed plantings, single variety/cultivar beds/borders, pillars, screening, ground cover, pergolas, arbours, formal planting designs, flowers, flower and foliage scent, ornamental thorns, security, hips, cut flower, hedging

Annual maintenance

Pruning, dead-heading, feeding, watering, pest, disease and disorder control and monitoring, support and ties

Unit 318

Establish and Manage Exterior Plant Displays

Outcome 5

Be able to manage the establishment and maintenance of trees and shrubs

Assessment Criteria

The learner can:

1. **Establish** trees, shrubs and hedges safely
 - Prepare soil to receive plants
 - Mark out the position from a plan
 - Planting
 - Immediate aftercare
2. Schedule the **maintenance** of woody plants to include trees, shrubs and hedges
3. Evaluate **pruning and training techniques** for woody plants
4. Summarise the **legal, environmental and health and safety requirements** for working with trees, shrubs and hedges

Unit content

Establish

Prepare soil to receive plants: by hand or with machinery, surface cultivation, soil improvement, vegetation removal, as applicable to site and type of plant

Mark out position from plan: specimen plant, plant groupings, linear planting

Planting: specimen plants, plant groupings, linear planting, pit planting (round or square holes), planting into cultivated sites, "T" and notch planting, planting depth, incorporation of organic matter/application of base dressing, use of aids to root development and anti-transpirants

Immediate aftercare: pruning and trimming, support (short, long, straight, angled, multiple stakes), protection from weeds, pests, disorders, provision of shelter, watering, mulching (all as applicable to site, situation and plant type)

Maintenance

Routine pruning, time of year/season, weather conditions, formative pruning for development of shape and habit, weed control, mulching, feeding, surface cultivation, pest, disease and disorder monitoring and control, clearance of detritus, removal/re-positioning of support and ties

Pruning and training techniques

Development of single leader, multiple leader and mop-headed forms, apical dominance, removal of feathers, creation of shapes/habits (fan, espalier), routine pruning of shrubs with spring flowers, summer/autumn flowers, winter stem displays, fruit and foliage displays, pruning with secateurs and hedge-trimmers, formative and routine pruning of formal and informal hedges, removal of dead, dying, diseased, reverted, weak, and, crossing stems as appropriate

Specialist techniques: pleaching, pollarding, stooling

Health and safety considerations, risk assessments

Legal, environmental and health and safety requirements

TPO's (Tree Preservation Orders), Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1992 (as amended 1999), Working at Heights Regulations 2005, Certificates of Competence (or QCF equivalent qualifications) e.g. chainsaw, climbing

Unit 318

Establish and Manage Exterior Plant Displays

Notes for guidance

This unit is designed to equip learners with the knowledge and skills required to develop the practical skills and knowledge to be able to plan and establish ornamental seasonal bedding schemes, herbaceous borders and woody plants in the open ground and in containers. The learner will also explore the use of colour, form and texture in ornamental displays and be able to schedule the maintenance of displays. Learners will need to appreciate the use of scale when drawing up plans and be able to calculate the required plant numbers as well as identifying a range of plants by the use of their full botanical names.

Outcome 1 covers the planning, establishment and maintenance of annual and herbaceous perennial displays. Sites should be both private garden situations and public areas, and to include parks and public gardens. Establishment includes the planting of spring and summer bedding plants (seasonal bedding) and herbaceous perennials. Specialist planting e.g. bulbs, carpet beds, plunge bedding may be considered through visits and demonstrations if preferred.

Learners must assess a specified site for its suitability, select plants, prepare scale plans, calculate plant numbers, and contribute to the establishment and maintenance of both a seasonal bedding display and an herbaceous border plan. Learners must be able to differentiate between edging, ground cover, dot, trailing season bedding plants and identify a minimum of ten (10) summer bedding, ten (10) spring bedding plants and ten (10) herbaceous perennials by their full botanical name.

Outcome 2 covers the planning, establishment and maintenance of containers in public and private situations. This should include the consideration and evaluation of seasonal displays such as those found in major shopping or other urban areas, as well as consideration of permanently planted containers. Learners must actually carry out the planning of both temporary and permanent displays in specified outdoor containers and sites, plant up and carry out the establishment and maintenance activities of plants in containers.

Outcome 3 covers the types of containers for use in public and private areas, growing media for containers and the preparation of soil for border planting, and the use of colour, texture and form in planted arrangements. A range of planting styles and themes should be explored to cover typical situations found e.g. in display borders in public and private gardens, themed container displays in major shopping and urban areas.

Outcome 4 considers the types and use of roses in all situations, from rose gardens to mixed plantings and for ground cover and landscape use. All forms of roses should be considered and evaluated. Specific requirements of soil and site preparation, planting and initial pruning of budded and cuttings-raised roses should be considered. Outcome 5 should include the establishment and formative pruning of trees but NOT pruning of established trees. Pruning activities will be carried out with secateurs, loppers, handsaws and polesaws but NOT with chainsaws.

Shrub and hedge pruning should cover a wide range of plant species and should always require that the learner demonstrates full understanding of the relationship between type and season of pruning and the species cultivar of plants involved. Formative and routine pruning should be planned and carried out. Learners must be able to identify and summarise the legal, environmental and health and safety requirements associated with the establishment and maintenance of tree and shrubs.

Learners should plan maintenance schedules for a range of woody plants as well as carry out maintenance activities

The unit may be delivered by a wide range of techniques, including lectures, video or DVD, supervised practical work, discussions, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities and learners should not be asked to undertake physical tasks beyond their physical capabilities. All tasks should be carried out within the appropriate season (time of year) and in the appropriate weather conditions.

References

Books

Derek Lovejoy Partnership. 1997. *Spon's Landscape Handbook*. Oxford: Taylor and Francis.

Websites

www.rhs.co.uk

The Royal Horticultural Society

Unit 319

Establish and Manage Interior Plant Displays

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to develop the skills and knowledge to be able to plan and establish interior plant displays in a range of temporary and permanent situations, and identify and manage the plant displays to ensure continued healthy development.

Learning outcomes

There are **five** learning outcomes to this unit. The learner will:

1. Be able to establish and manage plants in a permanent indoor setting
2. Understand the establishment of permanent interior plant displays
3. Understand the management of permanent interior plant displays
4. Be able to establish and manage temporary interior plant displays
5. Understand the management of interior plant displays

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

PH5 Promote the growth and development of crops

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 319

Establish and Manage Interior Plant Displays

Outcome 1

Be able to establish and manage plants in a permanent indoor setting

Assessment Criteria

The learner can:

1. Evaluate the **site suitability and requirements** and select **suitable plants**
2. Prepare interior **planting sites**
3. **Establish and manage** ornamental plants on interior **sites** with different **environmental conditions**

Unit content

Site suitability and requirements

Light, temperature range and fluctuations, air movement, humidity, air quality and pollution, site access, seasonality and day length factors, soil/growing media characteristics, aspect

Suitable plants

Tropical/sub-tropical, temperate, cool, dry/humid atmospheres, direct sun/diffuse light/poor light conditions, habit and size, tall, apical dominant, prostrate/horizontal, creeping, climbing

Planting sites

Primary and secondary ground cultivations (new/existing sites), drainage, growing media selection/amelioration, moisture retention, installation of irrigation/feeding systems, installation of plant supports, retention of growing media, application of base/top dressing, environmental conditions analysis/amendment

Establish and manage

Temperate, succulents and desert plants, displays including water features, draughty, still, hot, cold, arid, moist, sunny, bright and dull conditions

Planting (groupings, position, spacing, depth, firming, irrigation), provision of support, pest, disease, disorder monitoring and control, weed control in planted beds (hoeing, hand weeding, mulching), thinning, gapping- up, irrigation, environmental considerations (humidity, temperature, light, air quality (carbon dioxide levels) cutting back, and removal, label, all as relevant to site and situation.

Sites

Retail areas (indoor shopping centres etc), office buildings (atria and similar), display glasshouses (e.g. botanical collections, Alpine Houses, "Stove Houses") conservatories in private gardens and similar situations

Environmental conditions

Tropical/sub-tropical, temperate, cool, dry/humid atmospheres, direct sun/diffuse light/poor light conditions, air quality (carbon dioxide levels)

Unit 319

Establish and Manage Interior Plant Displays

Outcome 2

Understand the establishment of permanent interior plant displays

Assessment Criteria

The learner can:

1. Evaluate suitable **growing media and mulches** for tropical, temperate, alpine and arid interior environments
2. Explain the influence of **environmental factors** and their interactions on successful establishment and development
3. Evaluate **equipment** for measuring and controlling the interior environment

Unit content

Growing media and mulches

Soil-based, peat-based, alternative growing media, soil ameliorants, hydroponics, bark, cocoa shells, gravels, geo-textiles

Environmental factors

Temperature - tropical/sub-tropical, temperate, cool, cold, dry/humid atmospheres, direct sun/diffuse light/poor light conditions, air quality (carbon dioxide levels), seasonal/constant day-length, draughty, still, poorly ventilated, polluted atmospheres

Equipment

For measuring and controlling temperature, humidity, light levels, air cleanliness, computerised environmental controls, measuring instruments, light meters, conductivity and pH meters, thermometers, hygrometers and soil test kits.

Unit 319

Establish and Manage Interior Plant Displays

Outcome 3

Understand the management of permanent interior plant displays

Assessment Criteria

The learner can:

1. Explain the **care and pruning** required for plants in interior environments
2. Evaluate the requirements for **feeding and watering** interior displays and methods of application
3. Evaluate particular **problems** associated with interior plant displays with public access

Unit content

Care and pruning

Plant replacement and thinning, foliage and planter cleaning, dead-heading, pruning/stopping/pinching (shaping, removal of dead, dying, diseased, weak growth), trimming, training, tying-in, support, maintenance of appropriate atmosphere (carbon dioxide, light, humidity, temperature), pest, disease and disorder monitoring and control, maintenance of hygiene levels

Feeding and watering

Use of top-dressings and liquid feeding, irrigation and feeding related to species and display, seasonality, hand watering, automatic surface/sub-surface irrigation, hydroponics, automatic overhead irrigation and misting, conductivity and pH determination as appropriate, maintenance and amendment

Problems

Litter, plant damage and theft, pollution, site compaction, lack of/too much water, pest, disease and disorders, cool, cold, dry/humid atmospheres, direct sun/poor light conditions, air quality (Carbon dioxide levels), seasonal/constant day-length, draughty, still, poorly ventilated, polluted atmospheres

Unit 319

Establish and Manage Interior Plant Displays

Outcome 4

Be able to establish and manage temporary interior plant displays

Assessment Criteria

The learner can:

1. Evaluate the **location** for a temporary display and select plants that are compatible with each other and the immediate micro-climate
2. Plant and maintain **interior plants** in containers and temporary interior displays
3. Assess indoor plants for **signs of ill-health** and diagnose problems

Unit content

Location

Offices, entrance areas, reception areas, conference buildings, marquees, hotels and restaurants, Tropical/sub-tropical, temperate, succulents, desert plants
Draughty, still, hot, cold, arid, moist, sunny, bright, dull conditions, temperature range and fluctuations, air movement, air quality and pollution, site access, seasonality and day length factors, growing media characteristics including hydroponics, aspect

Interior plants

Tropical/sub-tropical, temperate succulents, desert plants
Aspect/siting, selection of containers/planters (dimensions, colour, materials, hydroponics), growing media, nutrients, pH, planting (groupings, position, spacing, depth, firming, irrigation), provision of support, pest, disease and disorder monitoring and control, thinning, gapping-up, irrigation, environmental considerations, cutting back, and removal, label, all as relevant to site and situation

Signs of ill-health

Stress, water-related, nutrition-related, atmosphere-related, humidity-related, light-related, due to public access

Unit 319

Establish and Manage Interior Plant Displays

Outcome 5

Understand the management of interior plant displays

Assessment Criteria

The learner can:

1. Specify the maintenance requirements of **temporary interior displays**
2. Describe commonly occurring **pests, diseases and disorders** of interior plants
3. Evaluate the use of **cultural, chemical and biological controls and integrated management programmes** for interior plant displays

Unit content

Temporary interior displays

Tropical/sub-tropical, temperate, succulents, desert plants

Pests, diseases and disorders

Pests: mites, insects, rodents

Diseases: fungi, viruses, bacteria

Disorders: caused by nutrition-related, water-related, light-related, atmosphere-related causes and physical damage

Cultural, chemical, biological controls and integrated management programmes

Cultural: hygiene, plant selection, watering, nutrition, pH, trimming, training, effective monitoring, light levels, atmospheric considerations including humidity, carbon dioxide levels

Chemical: pesticides (systemic, contact, surfactants), growth regulators

Biological: parasites, predators, bacterial and fungal agents, nematodes IPM:

combined systems based on effective monitoring and targeted action

Unit 319 Establish and Manage Interior Plant Displays

Notes for guidance

This unit involves the learner in all aspects of planning, establishing and maintaining interior plant displays. The range of display areas should cover examples of both permanent and temporary types, and may include specialist displays such as alpine houses and those in botanical collections as well as those within retail malls and office areas.

Health and safety considerations must be adhered to including the wearing of appropriate Personal Protective Equipment (PPE).

Outcome 1 covers the importance of site selection and evaluation for permanent displays and ensures that the learner will have the ability to decide on site suitability and to select plants that will have tolerance of the conditions in that site. All aspects of site environment should be considered and it may be useful to the learner to visit a range of sites where permanent displays are in place and actually carry out on-site evaluation using observation and appropriate technology to take measurements.

Site preparation will include soil/growing medium preparation, positioning of supports etc, as applicable to the situation. Planting may include young and semi-mature specimens, where immediate impact is required. Where possible a range of distinct environments should be established and maintained. If this is not possible then visits should be undertaken to ensure that the breadth of understanding of a range of environments is present.

Outcome 2 links closely to the first outcome in that the learner is asked to consider and understand all the factors about interior permanent display sites to ensure a full grasp of the factors involved in selection and management of growing media, mulches, equipment and environment are understood. The learners must appreciate the range of equipment available for monitoring growing conditions and be aware of their use and benefits, inclusive of computerised environmental controls, measuring instruments.

Outcome 3 covers an understanding of the maintenance requirements of permanent interior displays and should cover all aspects of watering, feeding and trimming/training, and be applicable to a range of display types. The relative merits of different means of irrigation and feeding should be explored, as well as pruning and training requirements of a range of different plant types. Full consideration should also be given to the particular requirements of sites where the public have unfettered access.

Outcome 4 focuses on temporary displays, covering all aspects of the site, environment, plant selection and management. Learners must evaluate a specified location for a temporary display and select plants that are compatible with each other and the immediate micro-climate, and then carry out the planting and maintenance of interior plants in containers and temporary interior displays. The learners could also be given responsibility for the selection of the containers/planters to be utilised.

Outcome 5 covers the health of plants in interior displays. There is no requirement to cover in detail the life cycles of pests and diseases as these are covered in a separate unit, but a wide range of problems should be identified by the learner from all the major problems that may occur. Pests such as mealy bug, soft brown scale insect, whitefly and spider mite must be recognised and the damage/symptoms identified. Diseases that should be covered include powdery mildew, leaf spot and virus diseases.

A clear understanding of the full spectrum of management and control options should be understood. An integrated approach to the management of problems is essential, especially in publicly accessed areas.

References

Books

- Derek Lovejoy Partnership. 1997. *Spon's Landscape Handbook*. Oxford: Taylor and Francis.
- Phillips, R., Rix, M. 1998. *Conservatory and Indoor Plants*. London: Pan Books.
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Unit 320

Understand Historical Influences on the Development of Gardens

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of historical influences on the development of gardens grassland management and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the skills and knowledge to appreciate the historical influences of plants and gardens and their development through history. The learner will be able to apply this knowledge to garden design plans.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Understand the styles of gardens through history
2. Be able to use historical data to influence current plans
3. Understand British gardens
4. Understand the introduction of plants into the UK

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 320

Understand Historical Influences on the Development of Gardens

Outcome 1

Understand the styles of gardens through history

Assessment Criteria

The learner can:

1. Evaluate the main historic developments in **landscape and garden styles** from ancient civilisations to the present time
2. Review the work of **influential designers**, the **gardens** they were associated with and the **characteristics** of their work
3. Describe the built features, soft landscape features and historical landscape features associated with each garden **style**
4. Discuss how the **timeline of art, architecture, social context and philosophies, faiths and religions** relate to the developments of landscape and garden

Unit content

Landscape and garden styles

Early civilisations: Chinese and Japanese gardens, Hispanic and Arabic gardens, Italian gardens, French gardens, Asian gardens, New world gardens, British gardens.

Built feature to include: balustrade, bee-bole, colonnade, finial, folly, gazebo, hermitage, icehouse, loggia, orangery, exedra, pagoda, pergola, peristyle, temples, treillage and trellis

Soft features to include: allee, arbour, avenue, bosquet, espalier work, green architecture, knot garden,

labyrinth, maze, parterre, pleaching, pollard, stilt hedges, theatre de verdure, turfed seat and topiary
Historical features to include: cascade, fenestration, grotto, ha-ha, hortus conclusus, mount, obelisk, pattes d'oeil, rond-point, trompe l'oeil and vista

Influential designers, gardens, characteristics

Sir Francis Bacon, Andre Le Notre, Charles Bridgeman, London and Wise, William Kent, Lancelot (Capability) Brown, Humphry Repton, John Claudius Loudon, Joseph Paxton, William Robinson, Gertrude Jekyll and Edwyn Lutyens, Beatrix Farrand, 'Vita' Sackville West, Sir Geoffrey Jellicoe, Roberto Burle Marx, Rosemary Verey, John Brooks

Style

Main built, hard and soft landscape features, historical landscape features associated with each style

Timeline of art, architecture, social context and philosophies, faiths and religions

The influence of these on gardens, how gardens have mirrored styles from art and architecture, developed during times of peace, initially formal following geometric pattern of irrigation channels, developed as scientific knowledge improved, gardens for contemplation, temple gardens, gardens for food, medicine and perfume, grand scale and intimate

Rate of new plant introductions gradually increased through the 17th and 18th centuries. Rapidly increased during the 19th and 20th centuries, leading to the Gardenesque styles and the flamboyant displays in 19th century public parks

Unit 320

Understand Historical Influences on the Development of Gardens

Outcome 2

Be able to use historical data to influence current plans

Assessment Criteria

The learner can:

1. Produce **garden design proposals** that evoke the spirit of historical styles

Unit content

Garden design proposals

Incorporation of historical styles, design principles/concepts to include balance and symmetry, repetition, proportion, focal points, views and borrowed landscape, hard and soft landscape features, clear conveyance of garden ideas, plant and feature maintenance

Unit 320

Understand Historical Influences on the Development of Gardens

Outcome 3

Understand British gardens

Assessment Criteria

The learner can:

1. Describe the **main gardens of historic interest** in the UK and the **ways in which plants have been displayed**
2. Assess the **influence of overseas gardens** on the development of British parks and gardens
3. Evaluate the **influences of the 20th century and contemporary designers**
4. Evaluate the **influences** of the media, garden shows, art and sculpture on contemporary garden design

Unit content

Main gardens of historic interest

Gardens studied should include: The Saville Garden, (Windsor), Sissinghurst Caste, (Kent), Hampton Court, (Middlesex), Hever Castle, (Kent), Great Dixter, (Sussex), Hestercombe, (Devon), Hidcote Manor, (Gloucestershire), Bodnant, (Gwynedd), Powis Castle, (Powys), Tresco Abbey, (Isles of Scilly), Stourhead, (Wiltshire), Stowe, (Buckinghamshire), Levens Hall, (Cumbria), Chatsworth, (Derbyshire), Blenheim Palace, (Oxfordshire), Alton Towers, (Staffordshire), Edzell Castle, (Angus), Inverewe, (Ross-shire)

Ways in which plants have been displayed

Private parks, gardens and collections, Royal parks and gardens, public parks and gardens, botanical collections, national plant collections (NCCPG), institutes and societies, (such as the Royal Horticultural Society, Forestry Commission, arboreta and specialist interest groups, such as The Primula Society)

Influence of overseas gardens

The influences from overseas should be explored for the gardens listed above, inclusive of French, Dutch, Italian, Chinese and Japanese, Islamic, Arabic, Asian

Influences of the 20th century and contemporary designers

Influences form the whole of the 20th century, from the arts and crafts, the garden of rooms, rock gardens, woodland gardens, Japanese gardens, through two world wars to contemporary designers and influences of the media, garden shows, art and sculpture influences

Identification/evaluation of: TV and printed media, garden shows, art and sculpture on contemporary garden design

To include: popularity, styles, trends, traditions, plant hybridisation, plants and plant usage, hard landscape features/materials, costs, gardening aids, tools/equipment/machinery

Unit 320

Understand Historical Influences on the Development of Gardens

Outcome 4

Understand the introduction of plants into the UK

Assessment Criteria

The learner can:

1. Evaluate the work of the **main, influential plant hunters**
2. Describe **plants collected** from the main regions of the world
3. Describe the **contemporary roles** of plant collections, herbaria, plant illustrations, botanists and their work in biodiversity and environmental issues

Unit content

Main, influential plant hunters

To include: John Tradescant (senior and junior), Sir Joseph Banks, Frances Masson, John Fraser, David Douglass, William Lobb, Robert Fortune, Sir Joseph Hooker, Charles Maries, Ernest Wilson, George Forrest, Frank Kingdon-Ward

Plants collected

Significant plants collected from Asia, including China and Japan, Australia and New Zealand, Alpine and other mountainous regions, Africa, North and South Americas, Europe and Mediterranean regions, Euro-Asian regions
Significant plants could include, *Pseudotsuga menziesii* (Douglas Fir), *Davidia involucrata* (Dove or Handkerchief Tree), *Liriodendron tulipifera* (Tulip Tree)

Contemporary roles

Plant and garden conservation (inclusive of NCCPG), historical and botanical, bio-diversity, extend scientific knowledge, protect endangered species and re-establish plants into the wild, Millennium seed-bank, provide a resource for other scientific and artistic work and disciplines
Use of/restoration of private parks, gardens and collections, leisure and sporting activities, public parks and gardens, botanical collections, source of energy (biomass), carbon dioxide extraction, medicinal, construction material, prevention of soil erosion, food and fair trade goods

Unit 320

Understand Historical Influences on the Development of Gardens

Notes for guidance

This unit is designed to enable the learner to develop the skills and knowledge required to appreciate historical influences on garden design, on the introduction of cultivated plants and to research the history of parks and gardens. This knowledge may then be applied to the development of appropriate designs for a variety of situations and to the sympathetic restoration of historical sites

In Outcome 1, the learner will explore and evaluate the main developments and changes in style and characteristics from ancient civilisations to the present day. They will require access to suitable library facilities and the Internet for research. Visits to historic gardens will also enhance the learners' understanding. Learners will need to review the work of influential designers, the gardens they were associated with and recognise the characteristics of their work, be able to describe the hard and soft landscape features associated with differing styles and discuss how the timeline of art, architecture, social context and philosophies, faiths and religions relate to the developments of the landscape and gardens and the influence they may have of current developments.

Outcome 2 gives learners the opportunity to apply their knowledge to current projects (a minimum of two (2)) and assess the extent of overseas influence on British gardens. Learners do not need to produce scales drawings but their plans should be clear and presented on an appropriate format.

In Outcome 3, learners have the opportunity to study British gardens and to evaluate the overseas and contemporary influences on their design.

Learners will need to identify the ways in which plants have been and are displayed, assess the influence of overseas gardens on the development of British parks and gardens, evaluate the influences of the 20th century and contemporary designers and those of the media, garden shows, art and sculpture on contemporary garden design.

In Outcome 4, learners will explore the work of the plant hunters, their plant introductions and the regions of the world in which they operated. Contemporary roles of plant hunters, plant collections and the work of botanists are considered. Up-to-date reference material will be required for these tasks and the work of Kew and Wakehurst Place would form a useful basis for study. Learners must undertake an evaluation of the work of the main, influential plant hunters, identify and describe plants collected from the main regions of the world. Together with demonstrating their ability to recognise and describe the numerous and varied contemporary roles of plant collections, herbaria, plant illustrations, botanists (and their work) in biodiversity and the environmental issues of the day.

The unit may be delivered by a wide range of techniques, including lectures, video or DVD, discussions, and research. Site visits will be of significant help to the learners, particularly after initial work in the centre. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues, including impact and the disposal of debris.

The content of the unit lends itself to undertaking off site visits to gardens and parks of note within the local area, thus enabling the learner to better appreciate and visualise design styles, features, plants and plantings covered during the formal lessons back at the centre. It is important that those seeking employment in this sector should have an appreciation of historic garden styles and their influence on the British garden landscapes, in order to be better placed to select the appropriate maintenance and management strategies required.

Lessons at the centre should utilise a 'pictorial' delivery style to create and maintain interest in a very visual

Unit 320

Understand Historical Influences on the Development of Gardens

Outcome 4
topic.

Understand the introduction of plants into the UK

References

Books

- Bisgrove, R. 1992. *The National Trust Book of the English Garden*. London: Penguin Books.
- Brown, J. 1999. *The English Garden through the 20th Century*. Suffolk: Garden Art press.
- Campbell-Culver, M. 2001. *The Origin of Plants*. London: Headline Book Publishing.
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- Hessayon, D.G. 1986. *The Armchair book of the Garden*. Andover: Expert Publishing.
- Landsberg, S. 1998. *The Medieval Garden*. London: British Museum Press.
- Lyte, C. 1983. *The Plant Hunters*. London: Orbis Books.
- Titchmarsh, A. 2003. *Royal Gardeners*. London: BBC Books.

Unit 321

Understand and Manage Landscape Restoration

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of how to understand and manage landscape restoration and how this can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the skills and knowledge involved in landscape restoration, including researching current and historical data, community involvement, the roles of relevant organisations, sourcing of materials and plants, and development of a management plan for future use or development

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to research historic sites
2. Understand how to research historic sites
3. Understand the conservation of historic sites
4. Understand the management of a restoration scheme

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

CU91 Assess the characteristics of sites

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 321

Understand and Manage Landscape Restoration

Outcome 1

Be able to research historic sites

Assessment Criteria

The learner can:

1. Undertake an **historic site inventory**
2. Research the **history and development** of an historic site
3. Explain the **importance of respecting** the privacy of current owners and complying with legislation during investigations

Unit content

Historic site inventory

Site survey, site inventory, visual, field-based methods, methods of recording (written, verbal, hand held computer), accurately record features on the site, use a range of techniques

History and development

Background research, access and record data, including plants, character, layout, buildings, grottos, walled gardens, boundaries, features including water, cascades, falls,

Use of: archival and library research (published material, maps and estate plans) museums, land registers, deeds, public and government records, county, district, parish and local surveys, illustrations, photographs and paintings, local knowledge, contacts and interviews

Importance of respecting

Privacy, maintain/develop co-operation and support, compliance with legislation, health and safety, environmental impact, avoidance of legal challenges, delays for non-compliance, potential financial impact

Unit 321

Understand and Manage Landscape Restoration

Outcome 2

Understand how to research historic sites

Assessment Criteria

The learner can:

1. Evaluate methods of **accessing and recording data** on historic sites
2. Describe **field-based methods** of collecting and recording specific data on historic sites, including plants, character, boundaries, evidence of historic/previous features
3. Explain appropriate **research practice techniques**
4. Explain methods of **collating and interpreting** data of historic sites

Unit content

Accessing and recording data

Field and research based, written data, interviews, surveys, oral methods of recording on site, data logging and computerised systems, qualitative and quantitative data

Methods of identifying and recording historic gardens include archival and library research, published, private papers and printed material, maps, tithe and estate plans, museums, land registers, deeds and public/private records, monuments records, public, government and private institutions records county, district, parish and local surveys, illustrations, photographs and paintings, local knowledge, contacts and interviews, sources outside the UK

Field-based methods

Observation of: ancient trees and stumps, specific plant species, age class, plant dimensions and plant health, visible historic layers general character and make up of plantings, notable views, evidence of old access routes, hard landscaping, buildings, evidence of original field boundaries, planting intervals, evidence of old avenues and formal planting patterns, special areas such as amphitheatres, earthworks, mounts, terraces, flower beds, greenhouses, walled gardens, main buildings, stable yards, bandstands,, lodges, entrance gates and fences, geo-survey techniques, excavation surveys, pollen counts, architectural finds

Research practice techniques

Observation and accurate recording of site features, as given above, plus geo-survey techniques, excavation surveys, pollen counts, architectural finds

Collating and interpreting

The following must be determined: characteristics of the site, scope and limits of the project, key areas to be addressed, level of detail and principle details required, methodology, analysis and chronology of data, assessment of present garden remains, significance and their condition, presentation of findings and recommendations (where appropriate), sensitivity of proposals (where appropriate), examination of alternatives, minimising/mitigating negative effects of intervention

Unit 321

Understand and Manage Landscape Restoration

Outcome 3

Understand the conservation of historic sites

Assessment Criteria

The learner can:

1. Evaluate the **loss and threats facing historic sites** and the importance of **garden restoration**
2. Describe the **roles of organisations** involved in the restoration of historic sites
3. Describe the **impact of special designations** on the development of landscape sites and proposals

Unit content

Loss and threats facing historic sites

Plants, features, buildings, habitats, aesthetics, economic and employment pressures, leisure and sport, need for land for housing and industry (conventional, technical and alternative, current farming and production practices)

Garden restoration

Appropriate hard and soft landscaping techniques, effects of intervention and how negative effects can be minimised or mitigated, importance of good working relationships with the owners and other interested parties, understanding of the technology used in the development of the site and subsequent management, such as the use of lime mortar, maintenance of historic structural lay out, plantings

Roles of organisations

English Heritage, National Trust, Natural England, Forestry Commission, Countryside Commission and it's equivalents, CIVIC trust, Crown authorities, Government bodies and departments (Department for Environment, Food and Rural Affairs (Defra) (England), Welsh Assembly Government (Wales), Scottish Executive Environment and Rural Affairs Department (SEERAD), Department of Agriculture and Rural Affairs (DARD NI), Environment Agency, Local and regional government, Interest groups and historic societies, such as the Victorian Society, Local trusts, conservation and volunteer organisations, European Union and overseas organisations

Impact of special designations

Conservation area status, Heritage status listing, Site of Special Scientific Interest (SSSI) status, Area of Outstanding Natural Beauty, National Parks, World Heritage

Unit 321

Understand and Manage Landscape Restoration

Outcome 4

Understand the management of a restoration scheme

Assessment Criteria

The learner can:

1. Explain the preparation of a **land management plan and interpretive scheme**
2. Review **sources of funding and specialist advice** for restoration schemes
3. Explain **sympathetic and practical uses** for historic sites
4. Describe **issues** pertaining to a successful restoration scheme, including accurate identification of the features and boundaries, setting decision making priorities, effective liaison with the owners and other interested parties, restoration techniques sympathetic to the site

Unit content

Land management plan and interpretive scheme

Procedure for a management plan: understanding different types of heritage, involving people, asset significance, exploring issues and opportunities, explanation of how to manage and maintain the heritage, implementation of the management plan, use, monitoring and reviewing of the plan, soils, levels, drainage, pH, plants, existing features and buildings, costs

Sources of funding and specialist advice

Sources of grant aid and fund raising and methods of application for these, including local, regional, national and European

Specialist advice from organisations listed in outcome 3 and for expert advice on trees, hydrology, architecture, safety

Sympathetic and practical uses

This may include opening as a visitor attraction, conservation and ecology, farm business, heritage centre, education centre, private ownership, public access, conference/wedding/concert facilities and maintain it as it exists with limited intervention

Issues

Accurate identification of the features, trees/plants and boundaries, setting decision making priorities, effective liaison with the owners and other interested parties, restoration techniques sympathetic to the site

Unit 321 Understand and Manage Landscape Restoration

Notes for guidance

This unit is designed to equip the learner with the skills and knowledge involved in landscape restoration, including researching current and historical data, community involvement, the roles of relevant organisations, sourcing of materials and plants, and the development of a management plan for future use or development of a site.

In Outcome 1, learners will carry out a site inventory for a specified and named site, identifying and using practical field-based methods. Researching current and historical data, with visits forming an integral part of the delivery, learners will also carry out background research using a wide range of techniques. Some group work is acceptable in the delivery of these units, but tutors must ensure that all learners are introduced to a wide range of research techniques. A site may have developed through several distinct garden styles, in which case decisions will need to be made as to which is of most historical significance or rarity.

In Outcome 2 learners will have the opportunity to demonstrate their ability to evaluate methods of accessing and recording data on an historic specified site, following on from and with the experience of Outcome 1. Field-based methods on collecting and recording specific data will be identified and described, including plants, site character, boundaries, evidence of historic/previous features. The research practice techniques and the methods of collating and interpreting data of historic sites will be recognised and explained.

In Outcome 3, learners will study the processes involved in the conservation of historic sites, the roles of organisations (e.g. English Heritage, National Trust, Natural England, Forestry Commission) and the community, together with the impact of special designations, such as conservation area status, heritage status listing, SSSI status, areas of outstanding natural beauty and national parks. World heritage status may present covering both advantages and the limitations they may present. Tutors are advised to work with actual, local sites to aid understanding. Learners may study existing proposals and/or completed schemes.

In Outcome 4 learners will demonstrate an understanding of the preparation of a land management plan and review sources of funding, identifying specialist advice for restoration schemes. They will be able to explain sympathetic and practical uses of historic sites and describe issues pertaining to a successful restoration scheme, including accurate identification of the features, buildings, styles and boundaries, setting decision making priorities. An integral part of any scheme is to develop and maintain effective liaisons with the owners and other interested parties, inclusive of identifying restoration techniques sympathetic to the site.

The unit may be delivered by a wide range of techniques, including lectures, video or DVD, supervised practical work, discussions, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities and site visits.

The content of the unit must be combined with off site visits to historic gardens and parks of note within the local area, thus enabling the learner to gain a better appreciation of and visualise, historic and contemporary design styles, buildings, features, plants and plantings covered during formal lessons at the centre. It is important that those seeking employment in this sector should have an appreciation of historic garden styles, site inventory and research methods and techniques.

References

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Unit 321

Understand and Manage Landscape Restoration

Outcome 4

Understand the management of a restoration scheme

J. 1999. *The English Garden through the 20th Century*. 2nd ed. Suffolk: Garden Art Press.

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Landsberg, S. 1998. *The Medieval Garden*. London: British Museum Press.

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Websites

www.english-heritage.org.uk	English Heritage
www.nationaltrust.org.uk	National Trust
www.naturalengland.org.uk	Natural England
www.environment-agency.gov.uk	The Environment Agency
www.defra.gov.uk	Department for Environment, Food and Rural Affairs
www.wales.gov.uk	Welsh Assembly Government
www.scotland.gov.uk	Scottish Executive Environment and Rural Affairs Department
www.dardni.gov.uk	Department of Agriculture and Rural Affairs (Northern Ireland)

Unit 322

Undertake Identification, Selection and Use of Ornamental Plants

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of how to undertake identification, selection and use of ornamental plants and how this can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

Learners will be able to identify plants by botanic name and specify and design ornamental plant displays that are suitable for the situation and site. In addition, learners will understand how to plant a range of plant types and provide immediate aftercare. They will also be able to specify future maintenance. Plant knowledge is the foundation of all good horticultural practice and is an essential tool for those with technical and supervisory roles in garden centres, parks, gardens and related areas.

Learning outcomes

There are **five** learning outcomes to this unit. The learner will be able to:

1. Be able to identify plants
2. Understand the factors that affect the selection of plants
3. Be able to prepare ornamental planting designs
4. Understand the planting of trees and shrubs
5. Know the aftercare requirements of ornamental plants

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

PH14 Identify and classify plants accurately using their botanical names

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 322

Undertake Identification, Selection and Use of Ornamental Plants

Outcome 1

Be able to identify plants

Assessment Criteria

The learner can:

1. **Identify** 200 plants botanical names as appropriate to industry setting
2. Explain the **classification of plants** from kingdom to variety and cultivar, and including inter-specific and bi-generic hybrids
3. Describe the use of **botanical and morphological features** and **keys** in the identification of plants

Unit content

Identify

In order to make the choice of plant identification more flexible, the following guides apply:

For **aboriculture** choose a minimum of 3 categories, with a minimum of 20 plants per category, to make up a total of 200

For **horticulture** choose a minimum of 4 categories, with a minimum of 20 plants per category, to make up a total of 200

- Annuals and tender perennials
- Hardy herbaceous perennials
- Alpines
- Grasses
- Shrubs
- Trees
- Weeds
- Water garden plants
- Native
- Indoor plants

Classification of plants

Classification should include kingdom, pteridophytes, gymnosperms, angiosperms, monocotyledons and dicotyledons, the major plant families, how and why plants are named.

Terms to include: genus, specific epithet, variety, cultivar, bi-generic hybrids (including graft chimera), bi-specific hybrids (inter-specific)

Botanical and morphological features

To include: calyx, corolla, androecium, gynoecium, and for morphological descriptions such as leaf shapes and margins, required in order for learners to successfully identify plants from a key. Features, habit (e.g. prostrate, horizontal, fastigiated, columnar, weeping, round, irregular), size, shape, preferred habitat, Leaf shape, apex, margins, colour and arrangement, bud shape, size and arrangement (opposite or alternate), stem colour and texture, stem and leaf modifications, flowers and fruit, colour shape, size, flower morphology, type of inflorescence, scent and fruit, Annual, biennial, perennial

Keys

Determine the family and genera of a plant using a flora.

Other sources for identification, including nursery catalogues and brochures, illustrated and specialist text books and Internet images

Unit 322

Undertake Identification, Selection and Use of Ornamental Plants

Outcome 2

Understand the factors that affect the selection of plants

Assessment Criteria

The learner can:

1. Evaluate the **suitability** of plants in relation to the following
 - climatic and microclimate
 - soil and drainage
 - Infrastructure
 - feasibility and cost-effectiveness
2. Evaluate the **aesthetic value of** plants and plant combinations
 - Rural/urban
 - Underground and overground services
 - Paths, highways, right-of-way
3. Describe the **plant factors** that influence selection; size and shape, possible seasonal nuisance, aesthetic merit, maintenance requirement

Unit content

Suitability

Climate and microclimate; shade pockets and sun spots, frost pockets, exposed, turbulent, and sheltered aspects, rainfall and temperature variations, localised humidity variations,

Soil, drainage, texture, structure, pH, nutrient status, anchorage, wet/dry, compaction

Environmental; geographic and latitude variations, topography, rural and built up

Feasibility and cost-effectiveness; cost of plants and subsequent maintenance

Aesthetic value of

Flowers (size, scent, colour), fruit (size, shape, colour), leaves (evergreen variegated, autumn colour, aroma), stems (fascinated, shape, colour, texture, colour), thorns (size, shape, colour) habit (includes; prostrate, columnar, weeping), seasons of interest

Plant factors

Characteristics and adaptations of plants growing in woodland and shade; full sun; dry and wet soils; meadow; wetland and fenland; coastal and maritime; acidic and alkaline; exposed upland; sheltered lowland areas:

Specific plant factors such as size, habit and shape, possible seasonal nuisance (leaves, fruit, brittle branches, root damage to buildings), aesthetic merit, maintenance required pest and disease susceptibility.

Unit 322

Undertake Identification, Selection and Use of Ornamental Plants

Outcome 3

Be able to prepare ornamental planting designs

Assessment Criteria

The learner can:

1. Evaluate **site conditions** in preparation for planting designs
2. Prepare **planting designs** which are appropriate for the site, including temporary and permanent displays.

Unit content

Site conditions

Opportunities and constraints; topographical, aspect, edaphic (includes - pH, nutrients, structure, texture, top soil depth), situation, local climate and micro-climate including rainfall, light, shade, temperature, coastal, air quality

Planting designs

Learners should understand the functional, aesthetic and thematic requirements of displays. Displays which take account of many factors: aesthetic, ecological, engineering, architectural, and sociological and produce designs that are formal, informal, temporary, permanent and themed

Displays from (not an exhaustive list): seasonal bedding including spring and summer bedding, plunge and carpet bedding, hardy annual borders, rose border, mixed woody plantings, herbaceous border, alpine feature, wildflower meadow

Unit 322

Undertake Identification, Selection and Use of Ornamental Plants

Outcome 4

Understand the planting of trees and shrubs

Assessment Criteria

The learner can:

1. Review the **categories of planting stock**
2. Evaluate the **equipment available** for planting trees and the suitability of specific equipment for different situations
3. Evaluate the **use of conditioners and ameliorants** in tree planting, including fertilisers, organic materials, mycorrhizae, water retention materials.

Unit content

Categories of planting stock

Industry criteria and standards for specifying and selecting plant material to include: size and height of plant, stem circumference, size and type of container/root ball, age of plant, nursery treatments, e.g. undercutting, formative pruning and training.

Refer to British Standards (BS) 3936 for nursery stock categories and specifications

Equipment available

Simple equipment for hand planting of herbaceous plants, seasonal bedding, shrubs and light standard and standard trees; specialised equipment for lifting, wrapping, root balling, transporting and planting heavy standards and semi-mature trees;

Techniques for mass planting, notch and "T" methods; pit planting; planting in heavy soils

Use of conditioners and ameliorants

Fertilisers (base/top dressings), bulky organic materials, mycorrhizae, ameliorants, water retention materials, mulches (organic, inorganic, mulch mats)

Unit 322

Undertake Identification, Selection and Use of Ornamental Plants

Outcome 5

Know the aftercare requirements of ornamental plants

Assessment Criteria

The learner can:

1. Describe **methods of protecting and supporting trees**, including shelters, fences, tree cages, tree guards
2. Describe the **aftercare requirements of planted areas**, including inspection, nutrition, watering, mulching, adjustment/removal of supports

Unit content

Methods of protecting and supporting trees

Use of tree shelters, fences, tree cages, tree guards, (function and types of each), materials/resources, application and construction methods

Protection from to include, rabbits, life stock, deer, frost/cold weather, exposed positions, strimmers Function of supports (anchorage, aerial support), types and suitability of supports for particular situations, height and vigour of trees, adjustment/removal of supports, short and long stakes length and circumference), single vertical stakes, diagonal stakes, double staking

Aftercare requirements of planted areas

Inspection, nutrition, watering, mulching, pest, disease and disorder monitoring and control, pruning (shape, size, dead, diseased, dying, weak, thin, crossing stems, reverted growth), deadheading weed control (manual and chemical), gapping up/re-planting

Unit 322

Undertake Identification, Selection and Use of Ornamental Plants

Notes for guidance

The learner will be able to identify plants by botanic name and specify and design ornamental plant displays that are suitable for the site and situation. In addition, learners will understand how to plant a range of plant types and provide immediate aftercare. They will also be able to specify future maintenance. Plant knowledge is the foundation of all good horticultural practice and is an essential tool for those with technical and supervisory roles in garden centres, parks, gardens and related areas.

Outcome 1 covers the identification of ornamental plants from recognition of the plant and by the use of plant floras, keys and other information. Learners should be able to confidently identify a minimum of two hundred (200) plants. Live specimens, either growing or as classroom samples are preferred, but high quality images may also be used, particularly to assist out-of-season identification or for plants that are not so common. Learners will need access to live specimens and reference material to practise identification. Specimens for identification must show the typical characteristics of the plant.

The following are examples of how the 200 plants could be split:

Example 1 (arboriculture): 80 trees, 70 shrubs, 30 natives, 20 weeds

Example 2 (horticulture): 20 alpiners, 40 perennials, 40 annuals and tender perennials, 50 trees, 30 shrubs, 20 grasses

Outcome 2 covers the suitability of plants for given situations and site. Learners will need access to a wide range of information for this outcome, which looks at the selection of plants considering their aesthetic and other plant characteristics, site conditions, location and infrastructure. A combination of formal delivery, visits and individual research may be found helpful. The outcome requires the learner to demonstrate their understanding of the unit outcomes by evaluating the suitability and aesthetic value of plants, explaining the influence of site infrastructure and describing the plant factors that influence selection.

In Outcome 3 learners will practise evaluating site conditions and preparing appropriate planting designs, which should include annual/spring and summer bedding/herbaceous and woody plants and temporary and permanent displays. Learners must prepare a minimum of two (2) planting designs which are appropriate for specified sites, one (1) temporary and one (1) permanent feature. They must use a suitable scale, give details of plant selection, spacing and quantities and be drawn in the conventional manner, inclusive of the north sign/symbol.

Outcome 4 covers the range of planting stock available, planting methods and equipment and the use of soil conditioners and ameliorants. Learners must review the categories of planting stock by reference to the British Standards (BS) 3936 inclusive of their specifications. They must evaluate the equipment available for planting trees and the use of conditioners and ameliorants in tree planting, including fertilisers, organic materials, mycorrhizae, and water retention materials.

Outcome 5 covers methods of supporting and protecting trees and the specification of maintenance for planting areas, inclusive of site inspection, irrigation, mulching, weed control and various pruning techniques. Learners must demonstrate their knowledge of the benefits of using organic and inorganic mulches, together with materials available, chemical, physical and cultural methods of weed control, together with the reasons for pruning and the various techniques used. It would be beneficial if learners could actually carry out the techniques in order to enhance and confirm learning. Access to manufacturers' literature and producers' literature and websites will be helpful. Dictionaries may be found that guided self-study is beneficial on these outcomes.

The unit may be delivered by a wide range of techniques, including lectures, video or DVD supervised practical work, experimentation, discussions, video, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible and every opportunity should be taken to show the link to horticultural practices. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

References

Books

- Brickell, C. 2007. *RHS Encyclopaedia of Gardening*. Harlow: Dorling Kindersley.
- Hillier Nurseries. 1998. *The Hillier Manual of Trees and Shrubs*. Devon: David and Charles Plc.
- Thomas, G.S. 2004. *Perennial garden plants*. London: Frances Lincoln.
- Clapham, A.R., Tutin, T.G., Warburg, E.F. 1962. *Flora of the British Isles*. Cambridge: Cambridge University Press.
- Phillips, R. et al. 1978. *Trees in Britain, Europe and North America*. New York: Pan Books.
- Phillips, R., Rix, M. 1993. *Perennials: Early Perennials v.1: Early Perennials Vol 1*. New York: Pan Books.
- Phillips, R., Rix, M. 1993. *Perennials: Late Perennials v.2: Late Perennials Vol 2*. New York: Pan Books.

Brochures from hardy plant nurseries in UK and Europe are also useful

Websites

www.rhs.org.uk

The Royal Horticultural Society

Unit 323

Maintain Turf in Parks and Gardens

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to develop the skills and knowledge involved in the maintenance of turf surfaces in parks and gardens. They will also cover the planning and management of an annual maintenance plan for high quality turf.

Learning outcomes

There are **five** learning outcomes to this unit. The learner will be able to:

1. Know the factors affecting the maintenance of established fine and coarse turf
2. Be able to maintain grassed areas
3. Be able to repair and renovate grassed areas
4. Be able to prepare an annual maintenance programme for a high quality turf area
5. Understand wildflower meadows and low maintenance swards

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L20 Plan the maintenance of sports areas

L22 Manage planted areas for their amenity use

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 323

Maintain Turf in Parks and Gardens

Outcome 1

Know the factors affecting the maintenance of established fine and coarse turf

Assessment Criteria

The learner can:

1. Explain the **soil and environmental factors** affecting maintenance operations on amenity turf
2. Explain how maintenance operations and their frequency and timing affect the **growth and development** of the sward
3. Identify **grass species and mixes** that are appropriate or detrimental to a range of amenity turf situations
4. Identify **weeds and weed grasses** of fine and coarse turf and appropriate means to **control** them.

Unit content

Soil and environmental factors

Effects of texture, structure, including compaction, pH, nutrition, pore space, soil organisms, rainfall, surface and sub drainage, light levels/shade, temperature, aspect, topography, presence of weeds (broad leaf and grasses), presence of pests, diseases and disorders, usage and frequency

Dealing with disorders, drought, compaction, poor nutrition, shade and methods to alleviate them

Growth and development

Mowing, cylinder, rotary and hover (frequency, height and quality of cut), aeration and scarification, bulky top-dressing, fertiliser application (top dressing), brushing and switching, frequencies of operations, settings and adjustment of machines, timing of use, control weeds (broad leaf and grasses), control of pests, diseases and disorders (and the effects of these on the growth), development and stress levels of the sward

Grass species and mixes

To include: *Lolium perenne*, *Agrostis spp.*, *Festuca rubra rubra*, *Festuca rubra*

commutata, *Poa pratensis* and *Phleum pratense* and suitable mixtures for fine turf, high quality coarse turf and hard wearing mixes

Weeds and weed grasses

Broad-leaved weeds of turf, means of spread, control measures to include: *Holcus lanata*,

Poa annua, *Luzula campestris*, methods to reduce infestation

Control

Use of selective herbicides, scarification, aeration, pH control/amendment, maintenance of appropriate nutrient levels (application of top dressings), application of bulky top dressings, mowing regimes (type of machine, frequency, height of cut), brushing and switching, removal of weeds by hand, timing of operations

Unit 323

Maintain Turf in Parks and Gardens

Outcome 2

Be able to maintain grassed areas

Assessment Criteria

The learner can:

1. Carry out **maintenance operations safely** on fine and coarse amenity turf including mowing, scarification and aeration
2. Identify **pests and diseases of turf** and select suitable control measures
3. Select an **appropriate fertiliser application rate** and calibrate a fertiliser distributor.

Unit content

Maintenance operations safely

Mowing (cylinder, rotary and hover), aeration and scarification, application of bulky top-dressings and fertilisers (top dressing), brushing and switching, edging turf, repair of turf (re-seeding and re-turfing small areas), reference to the need for autumn or spring renovation

Pests and five diseases of turf

Identify: five (5) diseases, five (5) invertebrate pests, five (5) mammalian and/or avian pests by symptoms, damage and live specimens (and/or pictorial images)

Appropriate fertiliser application rate

Calibration and method of working of each type of spreader by reference to make and model (e.g. cyclone – spinning disc) with reference to manufacturer's instructions, carry out simple calculations, adjust named spreaders in order to accurately calibrate each piece of equipment, select appropriate fertiliser (real or simulated)

Unit 323

Maintain Turf in Parks and Gardens

Outcome 3

Be able to repair and renovate grassed areas

Assessment Criteria

The learner can:

1. Assess the **condition** of worn areas of turf and select appropriate measures to renovate them
2. Carry out **repairs safely** by patching and over-seeding

Unit content

Condition

Bare areas, compacted areas, thin areas of the sward, broken edges, reinstatement of turf after temporary building and structures have been removed.

Evaluation of the conditions of the turf and selection of appropriate methods of repair by seed and/or turf

Repairs safely

Patching with turf, lifting and turning around edges, lifting turf and relaying to adjust levels, application of bulky top dressings as appropriate to method of repair, over-seeding with appropriate mixture

Unit 323

Maintain Turf in Parks and Gardens

Outcome 4

Be able to prepare an annual maintenance programme for a high quality turf area

Assessment Criteria

The learner can:

1. Specify and describe the **maintenance operations required** and machinery settings and timing of use
2. Estimate the **costs and resources required**, including labour, equipment, materials, specific expertise
3. Summarise the **legislative and environmental considerations** of maintenance operations.

Unit content

Maintenance operations required

To include mowing (cylinder, rotary and hover), aeration and scarification, application of bulky top-dressings and fertilisers (top dressing), brushing and switching, edging turf, repair of turf (re-seeding and re-turfing small areas), control of pests, disease and disorders, reference to the need for autumn or spring renovation, timings, weather conditions, appropriate machinery settings/adjustments, staff training

Costs and resources required

Estimation of costs involved in carrying out the maintenance plan, labour, equipment, maintenance of equipment, materials (consumables), specific expertise/advice

Legislative and environmental considerations

Compliance with legislation and codes of practice, Food and Environment Protection Act 1985, (FEPA), Control of Substances Hazardous to Health (COSHH) 2002, Control of Pesticides Regulations (COPR) 1986, Provision and Use of Work Equipment Regulations 1998 (PUWER), Reporting of Injuries, Diseases and Dangerous Occurrences Regulations 1995 (RIDDOR), Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1999, other current legislation or subsequent replacements. Environmental assessment, appropriate disposal of wastes

Unit 323

Maintain Turf in Parks and Gardens

Outcome 5

Understand wildflower meadows and low maintenance swards

Assessment Criteria

The learner can:

1. Specify the **establishment and maintenance** of wildflower meadows for:
 - Spring meadows
 - Summer meadows
2. Evaluate the benefits of **low maintenance swards**.

Unit content

Establishment of wildflower meadows

Soil conditions, pH and nutrient levels required, ways to reduce the fertility of the soil, establishment from seed and plants.

Suitable species for spring meadows and summer meadows

Maintenance of wildflower meadows

Suitable equipment, setting up, use and timing, maintenance schedules for spring meadows and summer meadows, allow seed to mature and fall, removal of hay

Low maintenance swards

Use of low maintenance swards, cost savings (labour, machinery, consumables), environmental benefits, methods such as increasing the height of cut, limited cuts per year with close mown paths, inclusion of other low growing plants

Unit 323 Maintain Turf in Parks and Gardens

Notes for guidance

The learner will be able to develop the skills and knowledge involved in the maintenance of turf surfaces in parks and gardens. They will also cover the planning and management of an annual maintenance plan for high quality turf.

Outcome 1 requires the learner to demonstrate their knowledge of the factors affecting the maintenance of established fine and coarse turf. They will be able to identify and explain soil and environmental factors which play a significant part in the selection and timings of maintenance operations and how the frequency and timings of such operations affect the growth and development of the sward. Learners must be able to identify a range of specified grass species (a minimum of five (5)) and mixtures, together with a range of common broadleaf and grass weeds of turf (a minimum of ten (10)). They must also be able to select the appropriate method(s) of control for each.

In Outcome 2 learners must be able to select appropriate equipment/machines, carry out any pre-start checks, adjustments, calibrate and carry out operations. They must be able to explain the purpose and benefits of each operation and justify their choice of equipment for maintaining fine and coarse turf. Learners must also demonstrate their ability to identify five (5) diseases, five (5) invertebrate pests and five (5) mammalian or avian pests of turf.

Outcome 3 covers all the types of remedial action that may be required to maintain the condition of the turf. The learner will be able to assess the condition of worn areas of turf and select appropriate measures in order to renovate them. This must include both seeding and laying turf. Learners must also be given the opportunity to identify and carry out repairs safely by patching and over-seeding.

Outcome 4 covers the preparation of an annual maintenance programme. Learners must be able to devise a maintenance programme for a specified area of turf and estimate all the costs involved and identify and summarise the legal and environmental issues concerned with the maintenance operations.

Outcome 5 covers wildflower meadows and low maintenance swards. Learners must be able to demonstrate their understanding of the creation and maintenance of wildflower meadows (spring and summer) and low maintenance swards. Tutors may find visits a useful medium for delivery of this, in addition to formal delivery.

This unit should be delivered as practically as possible, but a wide range of techniques can be used, including lectures, supervised practical work (in a centre or the work-place), discussions, site visits and research could be used. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities and learners should not be asked to undertake physical tasks beyond their physical capabilities. Learners should have appropriate access to suitable fine and coarse amenity turf areas for practical lessons and assessment. Where resources at the centre are limited, visits to parks and gardens would be useful to complement lessons at the centre. However, the learners should have regular access for practical work on amenity surfaces over at least one full season in order to develop their skills to the required level. All unit tasks must be undertaken at the correct time of year and in appropriate weather conditions.

Books

- Brickell, C. 2007. *The RHS Encyclopaedia of Gardening*. Essex: Darling Kindersley Publishers.
- Brown, S. 2005. *Sports Turf and Amenity Grassland Management*. Wiltshire: The Crowood Press Limited.
- Hope, F. 1990. *Turf Culture: A Complete Manual for the Groundsman*. London: Cassell Illustrated.
- Hubbard, C.E. 1992. *Grasses: v. 1: A Guide to Their Structure, identification, Uses and Distribution*. 3'd ed. Essex: Penguin Books.

Unit 324

Undertake Site Surveying, Levelling and Setting Out

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of how to undertake site surveying, levelling and setting out and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the skills and knowledge to survey a site for dimensions and level, using a range of techniques and to present the data in an appropriate format. Learners will also be able to set out geometric and irregular shapes and levels from a plan. This unit relates to the work of landscape designers and constructors, parks and gardens staff, nurseries and garden centres.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to measure site dimensions and levels
2. Understand site survey equipment and techniques
3. Understand the presentation of survey data
4. Be able to set out on the ground from plans, including shapes and levels

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L19 Create grassed and planted areas

CU91 Assess the characteristics of sites

Endorsement of the unit by a sector or other appropriate

This unit is endorsed by Lantra SSC

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 324

Undertake Site Surveying, Levelling and Setting Out

Outcome 1

Be able to measure site dimensions and levels

Assessment Criteria

The learner can:

1. Measure site dimensions and levels using a range of **survey equipment** safely
2. Record and collate **site readings**
3. Present **survey data** in an appropriate format

Unit content

Survey equipment

Use of equipment should cover safe site operations and behaviour and risk assessment. A sensible datum should be chosen

Equipment may include ranging rods/poles, chain lines and tapes, levels, laser levels and theodolites of various types and associated equipment, compass, optical equipment, height measuring devices and electronic measuring devices, Global Positioning Systems (GPS)

Site readings

Field books should be neat and clear

Sketch plans to record dimensions and the position of existing features and plants should be large enough to avoid confusion/ambiguity

Normal conventions for recording rise and fall should be used for recording levels

Survey data

Base and location plans, contour illustrations, section views for specified sites

Unit 324

Undertake Site Surveying, Levelling and Setting Out

Outcome 2

Understand site survey equipment and techniques

Assessment Criteria

The learner can:

1. Explain the safe use and maintenance of **surveying equipment**, including poles, tapes, optical and laser levels and theodolites, electronic and Global positioning systems (GPS) measuring devices
2. Explain the **principles** and **processes of surveying techniques**, including triangulation, bearings and offsets, sloping ground, GPS and total stations including dealing with site problems, sources of error and degrees of accuracy

Unit content

Surveying equipment

Ranging rods/poles and tapes, levels, laser levels and theodolites of various types and associated equipment, compass, optical equipment, height measuring devices and electronic measuring devices, Global Positioning Systems (GPS)

Principles of surveying

Linear measurement, right angles, bearing and offsets, triangulation and trigonometry, traverse and radial surveys, sloping ground, adjustments, vertical angles, height measuring, levelling and contour surveys, optical measuring, GPS grid referencing and altitude location, total stations and computer aided systems, maps, plans, IT based maps and other information sources, relevant legislation

Process of surveying techniques

Reconnaissance, observation, measurement, recording presentation, booking systems and symbols, site problems, obstacles and solutions, sources of error, adjustments and degrees of accuracy, development and use of computer based systems of recording field data, selection of the most appropriate system for given site conditions

Unit 324

Undertake Site Surveying, Levelling and Setting Out

Outcome 3

Understand the presentation of survey data

The learner can:

1. Explain the **purpose and application** of different survey types, metric scales, units of measurement, grid references and bearings
2. Describe the process of **laying out, plotting and draughting** survey drawings from field data
3. Review the use of Global Positioning Systems (GPS), Geographical Information Systems (GIS) and computer aided **draughting systems** of plotting surveys

Unit content

Purpose and application

Types of survey plan, use of metric scale and units of measurement, bearings and grid references

Laying out, plotting and draughting

Standard techniques, standard conventions, symbols and signs, lettering symbols, position, size and style, title blocks and labelling, orientation and types of north, radial and trigonometric methods of plotting, terminology
How to calculate levels and interpolate contours onto survey plans
How to calculate true scale, reduce error, make adjustments and the importance of accuracy

Draughting systems

Draughting systems of plotting surveys reviewed, standard techniques, standards conventions

Unit 324

Undertake Site Surveying, Levelling and Setting Out

Outcome 4

Be able to set out on the ground from plans, including shapes and levels

Assessment Criteria

The learner can:

1. **Mark out sites from plans** of different scales, including features, structures and plants
2. **Set out** rectangles, circles, hexagons, ellipses and irregular shapes
3. Set out **levels and falls** accurately and in compliance with site safety requirements

Unit content

Mark out sites from plans

Plans of different scales should be used so that learners become familiar with the process of conversion

The position of structures, features and plants should be marked out using suitable equipment

Construction of accurate right angles and marking out of rectangles, circles, hexagons, ellipses and irregular shapes to the correct dimensions

Set out

Construct a right angle by intersecting arcs and by Pythagoras' theorem (3, 4, 5 triangle) and mark out rectangles, circles, hexagons, and ellipses on the ground.

Levels and falls

The learner should be able to set out levels and falls using plans of different scales

Ensure specified orientation, set out line to given length, establish level(s) to given parameters, identify datum point

Unit 324 Undertake Site Surveying, Levelling and Setting Out

Notes for guidance

This unit is designed to equip the learner with the skills and knowledge required to collect, record and collate site survey data and to produce a site plan. It also covers setting out of borders, features structures and plants from data on a scaled plan. As such it can be applied to most horticultural situations, including landscape designers and constructors, parks and gardens staff and nurseries and garden centres.

In Outcome 1 the learner must be able to demonstrate their ability to accurately measure the dimensions and levels of specified sites. They should be provided with a range of survey equipment to use in order to develop their awareness, familiarity and all round skill levels. They will need to develop an understanding of the benefits and limitations of tools/equipment used. Learners must accurately record and collate the site readings and then present the survey data using an appropriate and conventional format. This can be accomplished by delivering the outcome around a single specified site, so that project progression may be recognised.

In Outcome 2 learners are required to recognise and demonstrate an understanding of the varied site survey equipment available and the techniques associated with their use. They must explain the safe use and maintenance of that surveying equipment and the principles and processes of conventional surveying techniques

In Outcome 3 learners will develop an understanding of the diverse methods of recording and presenting survey data. They must be able to identify and explain the purpose and application of different survey types, using metric scales and units of measurement, use grid references and bearings, together with recognising and describing the process of laying out, plotting and draughting survey drawings from data collected from the a field survey. Learners should also be able to review the use of specified draughting systems of plotting surveys. Where facilities in centres are limited, site visits will be helpful and internet research will be particularly useful for information about the more recent introductions. Learners will require access to draughting materials for this unit.

Outcome 4 enables the learners to demonstrate an ability to set out shapes and levels on the ground from given plan drawings. They must set out accurately varied geometric and irregular shapes, including rectangles, circles, hexagons and ellipses. They will use intersecting arcs and Pythagoras theorem (3, 4, 5 triangle).Learners should also be able to set out levels and specified falls using plans of different scales, ensuring specified orientation and be able to identify suitable datum points.

The unit may be delivered by using a wide range of techniques, including lectures, video or DVD, supervised practical work, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

References

Books

Bhavikatti, S.S. 2008. *Surveying and Levelling*. New Delhi: I K International.

Knight, B.H., Brend, H.J. 1968. *Surveying and Levelling for Students*. 4th ed. Glasgow: Maclaren and Sons.

Subramanian, R. 2008. *Surveying and Levelling (Oxford Higher Education)*. New Delhi: OUP India.

Tate, T. 2008. *Principles of Geometry, Mensuration, Trigonometry, Land Surveying and Levelling*. Charleston: Bibliobazaar.

Unit 325

Undertake Specification, Programming and Monitoring of Landscape Projects

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of how to undertake specification, programming and monitoring of landscape projects and how these can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the skills and knowledge required by those working with landscape contracts and can be assessed in the context of landscape works or landscape maintenance. It includes the preparation of landscape specifications for proposed projects and estimating and costing projects. The interpretation of contracts, managing contracts and monitoring contracts against specification are also covered.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to prepare landscape specifications and estimate costs
2. Understand the preparation of landscape specifications
3. Understand the estimation of costs for landscape projects
4. Be able to interpret and monitor contracts for landscape projects

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L16 Specify and monitor landscape maintenance

L26 Estimate resource requirements and programme work

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 325

Undertake Specification, Programming and Monitoring of Landscape Projects

Outcome 1

Be able to prepare landscape specifications and estimate costs

Assessment Criteria

The learner can:

1. Prepare **written specifications** for a proposed landscape construction or maintenance project
2. Produce resource estimates and schedules of cost, using **correct formulae for calculation**
3. Produce clear and concise **specification** clauses using appropriate phraseology for maintenance or construction work.

Unit content

Written specifications

For groundworks, hard landscape construction, soft landscape installation or landscape maintenance and aftercare, inclusive of bills of quantity

Correct formulae for calculation

Correct formulae for calculating quantities (construction materials, labour, soils, plants, seed, and other consumables), areas and volumes, (regular and irregular shapes), for excavation, earthworks and plantings

Specification

Specify for the following and include them in specifications as appropriate: weight in tonnes per cubic metre of material to include aggregates, concrete, mortar, stone, soils, composts, mulches and top dressings, coverage rate per square metre of materials to include aggregates, paving and walling units, concrete, mortar, soils, composts, mulches and top-dressings, minimum distances for planting trees from buildings and services, minimum gradients for pedestrian surfaces, storm water and landscape drains and angle of repose for loose soils and materials, minimum depths of services and types of indicator warning tape, irrigation, drainage and water pump dimensions, requirements and calculations for garden and landscape, timber sizes for summer houses, decked surfaces, pergolas, fences and similar timber structures, brick and block dimensions, standard mixes, ingredients and calculations for various built surfaces and structures according to use and soil type and their limitations

Unit 325

Undertake Specification, Programming and Monitoring of Landscape Projects

Outcome 2

Understand the preparation of landscape specifications

Assessment Criteria

The learner can:

1. Evaluate existing **specification examples** and other sources of information for the development of specifications
2. Explain **conventions and standard presentation** styles relevant to the preparation of landscape specifications
3. Review **statutory requirements** affecting landscape operations.

Unit content

Specification examples

Specifications to include: for ground-works, hard landscape construction, soft landscape installation or landscape maintenance and aftercare

Conventions and standard presentation

Styles for: landscape construction, soft landscape, site specific requirements

Statutory requirements

Risk assessment, construction design and management regulations (CDM Regulations), Codes of Practice and safe working conditions, limitations and obligations imposed on specifiers

Unit 325

Undertake Specification, Programming and Monitoring of Landscape Projects

Outcome 3

Understand the estimation of costs for landscape projects

Assessment Criteria

The learner can:

1. Explain **procedures** to
 - calculate the cost of measured work and non-work items
 - determine a rate
 - present costs
2. Evaluate techniques for preparing **bills of quantity** for materials, construction and resource estimates
 - Landscape data
 - Standard minute values
3. Explain how to identify sources of supply and obtain quotations, competitive prices and estimates

Unit content

Procedures

Measured work: prime cost sum, allowances and labour rate

Non-work items: preliminaries, overheads, profit, discounts, adjustments, inflation, depreciation and VAT

Determine a rate: using published pricing schedules, working up a rate, computer based techniques to produce, cost and quote for landscape work

Present costs: schedules, feed bid and letter, form of tender and quotation

Bills of quantity

To include: hard and soft materials, machinery, labour, time requirements, taking off measurements, squaring dimensions and calculating quantities, abstracting, writing a bill

Landscape data is listed in Outcome 1

Sourcing of details of standard minute values and other published estimating data for both manual and mechanical work including turf work, establishment and maintenance, border maintenance, planting and establishment of soft landscapes, leaf and litter clearance, herbicide applications, hedge maintenance, fence construction, path and edging maintenance, groundworks, hard landscape construction, walling and paving

Unit 325

Undertake Specification, Programming and Monitoring of Landscape Projects

Outcome 4

Be able to interpret and monitor contracts for landscape projects

Assessment Criteria

The learner can:

1. Use efficient **systems** to plan and prepare a sequence of operations for a landscape project using contract data
2. Assess that landscape construction or maintenance work meets the **required standard**
3. **Monitor operations** to ensure work is carried out in an appropriate and safe manner

Unit content

Systems

Identify and select procedures/systems to evaluate, ensure quality, conformity, use of materials, adherence to deadlines and specifications, frequencies, duration, adherence to legislation, risk assessments, environmental impact assessments, use of risk management register

Required standard

Quality, conformity, use of specified hard and soft materials condition and supply, adherence to low, medium and high deadlines

Monitor operations

Monitoring accurately against specification, monitoring frequencies and duration as appropriate to the project, adherence to legislation, risk assessments, environmental impact assessments

Unit 325 Undertake Specification, Programming and Monitoring of Landscape Projects

Notes for guidance

This unit is designed to equip the learner with the skills and knowledge required by those working with landscape contracts and can be assessed in the context of landscape works or landscape maintenance. It includes the preparation of landscape specifications for proposed projects and estimating and costing projects. The interpretation and monitoring of contracts against specification is also included.

In Outcome 1 learners will develop skills and knowledge in specifying landscape projects. Demonstrating their ability to prepare a written landscape specification and estimate costs for the specified project, the specifications must be deemed practical and workable, inclusive of the estimation of resources/materials required. This will include the identification and use of the correct formulae for such calculations. Learners must also produce clear and concise specification clauses using appropriate phraseology for the maintenance or construction of work carried out for a specified project.

Learners should study a range of projects in order to practice and develop the required level of skill and understanding of the techniques and data involved.

In Outcome 2 learners must demonstrate their ability to evaluate two (2) existing landscape specification examples and one (1) other source of information for the development of such specifications. They will identify, use and explain conventions and standard presentation styles relevant to the preparation of landscape specifications, including the applications and site specific requirements. Learners must also identify statutory requirements (including the Health and Safety at Work etc Act 1974 and Management of Health and Safety at Work Regulations 1992 (as amended 1999) affecting landscape operations and carry out a review of those requirements.

In Outcome 3 learners will practice estimating and costing landscape projects using appropriate techniques. Learners must use and review landscape data and standard minute values required for costing projects. They will identify and explain procedures to calculate the cost of measured work and non-work items, and prepare two (2) bills of quantity and review the techniques used specifying materials, construction and resource estimates. Learners will also know how to identify sources of supply and obtain quotations, inclusive of ensuring competitive prices and estimates. Learners may work with actual or simulated projects, but tutors should make these as real as possible to aid understanding.

In Outcome 4 learners will develop their skills and knowledge of monitoring and interpreting landscape projects. Learners must identify and use efficient systems in order to plan and prepare a sequence of operations for a specified landscape project using contract data. They must carry out an assessment to ensure that landscape construction or maintenance work meets the agreed standard and then monitor the progress/operations of a project to ensure work is carried out in an appropriate and safe manner. Projects should be a near to real work situations as possible. Visits to a local authority parks department or large landscape contracting company would be beneficial to see how these tasks are carried out in the industry.

The unit may be delivered by a wide range of techniques, including lectures video or DVD, supervised practical work, discussions, site visits and research. Learners will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

Unit 325

Undertake Specification, Programming and Monitoring of Landscape Projects

References

Books

- Chadwick, R.M. 1990. *Spon's Grounds Maintenance Contract Handbook*. London: Taylor and Francis.
- Langdon, D. 2009. *Spon's External Works and Landscape Price Book 2010*. London: Taylor and Francis.
- Clamp, H. 1986. *Spon's Landscape Contract Manual: A Guide to Good Practice and Procedures in the Management of Landscape Contracts*. London: Spon Press.
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Unit 326

Construct Horizontal Landscape Surfaces

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of how to construct horizontal landscape surfaces and how this can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will be able to develop the skills and knowledge to construct horizontal landscape surfaces, including setting out the site and constructing rigid and flexible surfaces and simple steps. They will consider the range of materials and techniques and the health and safety implications of this work.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will be able to:

1. Be able to form ground profiles for landscape works
2. Understand the formation of ground profiles for landscape works
3. Be able to construct horizontal surfaces and simple steps
4. Understand the maintenance of horizontal surfaces and simple steps

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L23.1 Form ground profiles for landscape work

L24.1 Lay hard surfaces

CU20.1 Maintain structures and surfaces

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 326

Construct Horizontal Landscape Surfaces

Outcome 1

Be able to form ground profiles for landscape works

Assessment Criteria

The learner can:

1. **Set out** a site from a plan
2. Establish a **suitable sub-base and base** according to specifications

Unit content

Set out

Interpret plan(s), accurate boundary dimensions and shapes are to be marked out, the learner should be able to mark out straight lines, curves and irregular shapes, triangulation, running lines and offsets to be used, this will require the use of right angles, levels and carry out changes of level/gradient work, use mechanical and manual methods of establishing horizontal and vertical profiles

The plans must be correctly orientated working from an appropriate base line on the plan

Suitable sub-base and base

Establish suitable sub-base and base according to specifications, accurate dimensions and orientation

Unit 326

Construct Horizontal Landscape Surfaces

Outcome 2

Understand the formation of ground profiles for landscape works

Assessment Criteria

The learner can:

1. Describe **construction standards and regulations** for operations involving foundations
2. Evaluate the range of **layers and materials** and their uses
3. Identify **potential sources of waste** adverse environmental impact and methods to minimise and optimise these
4. Explain typical site **problems and contingencies** for dealing with them

Unit content

Construction standards and regulations

Current standards and regulations, where to source current information, safe working practices, risk assessments, risk management, Control of Substances Hazardous to Health Regulations 2002 (COSHH), Personal Protective Equipment (PPE), building and construction standards, certificates of competence and other required qualifications

Layers and materials

Sub-grade, sub-base, base, formwork, trench supports, edge restraints, geo-membranes, granular fill, concretes, reinforcements

Potential sources of waste

Waste materials through poor, incorrect and excessive ordering, poor handling or storage, weather damage, wasted time through poor systems

Problems and contingencies

To include, site services (known and unknown), soft pockets, permits, unexpected finds, ground pollution, weather conditions (including water logging, frost, snow), boundary disputes, shortage of labour/skills, delays in delivery of materials, equipment/machinery breakdown, inappropriate equipment/machinery on site, contingency plans

Unit 326

Construct Horizontal Landscape Surfaces

Outcome 3

Be able to construct horizontal surfaces and simple steps

Assessment Criteria

The learner can:

1. Construct **rigid hard surfaces** safely
2. Construct **flexible hard surfaces** safely
3. Set out formwork and construct **simple steps**
4. Describe the **legal requirements** for steps, including the dimension of risers and treads

Unit content

Rigid hard surfaces

Flag stones or pavers (natural and artificial), concrete, tarmac, block paving, foundation materials, weather resistant surface treatments. Identify line, remove debris, excavate (line, level and depth), drainage, fit edgings as appropriate, consolidate sub-base, lay surface/consolidate material, repair environmental damage Site security, safe and tidy site, site signage, minimisation of waste, minimisation environmental impact on site, access to site (staff and materials),

Identify likely problems and contingencies, compliance with legislation, industry best practice

Flexible hard surfaces

Gravels/aggregates, hogan, bark chip and other loose materials, foundation materials, weather resistant surface treatments

Identify line, remove debris, excavate (line, level and depth), drainage, fit edgings as appropriate, consolidate sub-base, lay surface/consolidate material, repair environmental damage

Site security, safe and tidy site, site signage, minimisation of waste, minimisation environmental impact on site, access to site (staff and materials)

Identify likely problems and contingencies, compliance with legislation, industry best practice

Simple steps

Erect formwork and construct simple steps from a plan

Select materials sensitive to area, identify line and dimensions of tread and risers, mark out step line, width and location of risers, excavate, construct treads and risers and fix, fit side supports and handrails as required, repair environmental damage, remove debris

Identify likely problems and contingencies, compliance with legislation, industry best practice

Legal requirements

Identify for: steps, risers and treads, building and construction standards

Unit 326

Construct Horizontal Landscape Surfaces

Outcome 4

Understand the maintenance of horizontal surfaces and simple steps

Assessment Criteria

The learner can:

1. Summarise the **estimation of run off and drainage requirement** and where to source expert advice
2. Evaluate the effectiveness of a range of **maintenance operations**

Unit content

Estimation of run off and drainage requirement

Learners should understand the principles involved and where to source information and expert advice Water run off, drainage requirements, drainage fall, construction materials and characteristics, estimation of construction requirements

Maintenance operations

Where to source technical information for specifying maintenance, statutory requirements, maintenance operation for the range of surfaces in the unit, potential problems during maintenance and how to overcome them, compliance with health and safety legislation

Unit 326 Construct Horizontal Landscape Surfaces

Notes for guidance

Learners will be able to develop the skills and knowledge to construct horizontal landscape surfaces, including setting out the site and constructing rigid and flexible surfaces and simple steps. They will consider the range of materials and techniques and the health and safety implications of this work. They will develop further practical landscape skills acquired at level 2, and be able to set and mark out the site from a scale plan and form ground profiles. A greater depth and breadth of technical knowledge and skill is required at this level, including a wide range of materials and their uses.

Outcome 1 covers the practice and theory of marking out and forming ground profiles. Learners will need to practise transferring information from scale plans and marking out geometric and irregular shapes. They will also need to practise establishing and marking levels and gradients. The learner must be able to transfer information from a scale plan to the ground, position effective markers on the ground, for linear measurements, shapes (rectangles, circles, ellipses and irregular shapes) and levels and carry out changes of level/gradient work as required. Learners must also be able to demonstrate that they can establish a suitable sub-base and base for subsequent work, according to project specifications. They must also understand how to determine foundation depths relevant to a specified site.

The theory in Outcome 2 could be delivered by a combination of lectures and guided research, though every opportunity to undertake and make reference to practical projects will undoubtedly increase the learner's ability to grasp the concepts involved. Learners must be able to demonstrate an understanding of the formation of ground profiles for landscape works, they must be able to describe construction standards and regulations for operations, evaluate the range of layers and the various materials available, together with identifying their uses. As with any landscape project wastage is likely to occur and learners must therefore be able to identify potential sources of waste and recognise methods to minimise them. Learners should identify and explain typical site problems and be able to make contingencies plans for dealing with them. It would be useful if this could be carried out for an actual ongoing landscape project.

In Outcome 3 learners must be able to construct hard surfaces including the use of flags or pavers/paviours, concrete and block paving. They should be aware of potential problems during construction work and know how to overcome them. Learners must also be able to construct simple steps from a plan, demonstrating an understanding of the legal requirements, including the dimension of risers and treads. They should keep the sites safe and tidy during construction, minimise unnecessary waste and unwanted environmental impact to the site and use protection techniques for security and to protect the work until it is ready for use. They should be aware of potential problems during all construction work and recognise how to overcome them. Learners must comply with legislation during construction.

In Outcome 4 learners must be able to demonstrate an understanding of the maintenance operations for horizontal surfaces and for steps. Learners must summarise the estimation of water run off and the drainage requirements, together with where to source expert help and be able to evaluate the effectiveness of a range of maintenance operations.

The unit may be delivered by a wide range of techniques, including lectures, video or DVD, supervised practical work, site visits and research. Real projects are a valuable means to boost learners' confidence, technique and understanding, following initial acquisition of the skills. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities and learners must comply with all current legislation.

References

Books

- Brickell, C. 2006. *RHS essential garden planning and construction*. London: Mitchell Beazley
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www.pavingexpert.com

www.cambridgeshire.gov.uk/leisure/libraries/online/bgsi.htm gives free access to British standards online

Unit 327

Construct and Maintain Timber Landscape Features

Level: 3

Credit value: 10

Unit aim

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

The learners will be able to develop the skills and knowledge to be able to construct and maintain timber landscape features. They will consider the range of materials and techniques, and the health and safety implications of this work.

Learning outcomes

There are **three** learning outcomes to this unit. The learner will be able to:

1. Be able to construct timber features
2. Understand the construction of timber features
3. Understand the maintenance and preservation of timber features

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L24.3 Install hard landscape features and structures

CU20 Maintain and repair structures and surfaces

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 327

Construct and Maintain Timber Landscape Features

Outcome 1

Be able to construct timber features

Assessment Criteria

The learner can:

1. Construct and repair **horizontal timber features** safely
2. Construct and repair **vertical timber features** safely
3. **Maintain** timber feature safely
4. Describe the **security of the site and protection of the work** until it is in a useable condition

Unit content

Horizontal timber features and vertical timber features

Follow specifications, identify line, dimensions and orientation of feature

Construct horizontal and vertical timber features from, decking, post and rail fences, gates, simple steps, bridges, pergolas, arbours and palisades, use appropriate joins and techniques

Identify and carry out repairs efficiently, make feature safe before and after work, comply with current relevant legislation, manual handling, Control of Substances Hazardous to Health (2002) (COSHH), Personal Protective Equipment (PPE), other specific legislation

Maintain

Identify and assess maintenance requirements, carry out maintenance operations safely (apply wood preservatives, repair/replacement/secure), adherence to health and safety legislation including working from heights, risk assessments

Security of the site and protection of the work

Ensure a safe, secure site and tidy site, site signage, minimise unnecessary waste, minimise detrimental environmental impact, identification of potential problems, adverse weather conditions, make contingency plans, wearing of appropriate PPE, compliance with current health and safety and construction legislation

Unit 327

Construct and Maintain Timber Landscape Features

Outcome 2

Understand the construction of timber features

Assessment Criteria

The learner can:

1. Evaluate a range of **timber features and their uses**, including decking, steps, bridges, pergolas, arbours and palisades
2. Describe typical **repair requirements of timber features**; structural damage, decay patterns in horizontal and vertical timbers and repair technique
3. Evaluate a range of **timbers suitable for outdoor use** and appropriate timber treatments
4. Explain **potential problems** that may occur and how to overcome them

Unit content

Timber features and their uses

Decking, steps, bridges, pergolas, arbours, palisades, post and rail fences, gates

Evaluation to include: uses, materials, benefits, limitations, maintenance requirements, ease of repair, health and safety

Repair requirements of timber features

Structural damage, decay patterns in horizontal and vertical timbers, making safe and repair techniques

Timbers suitable for outdoor use

A range of softwood and hardwood timbers suitable for outdoor use, relative costs, life expectancy, ease of fabrication, the merits and limitations of each, types of feature for which each is appropriate, preferred preservation techniques for each type

Potential problems

Site services, anchorage, permits, unexpected finds, weather conditions, boundary disputes, minimising waste, waste materials through poor or excessive ordering, poor handling or storage, weather damage, waste time through poor systems

Unit 327

Construct and Maintain Timber Landscape Features

Outcome 3

Understand the maintenance and preservation of timber features

Assessment Criteria

The learner can:

1. Evaluate the **use and effectiveness** of **paints, water-based and solvent-based preservatives**
2. Evaluate technical information for **specifying the maintenance** of timber
3. Summarise the environmental and health and safety **legislation** and codes of practice relating to the construction and maintenance of timber features

Unit content

Use and effectiveness of paints, water-based and solvent-based preservatives

Safety, handling, use, PPE, decontamination/cleaning of operative and equipment, equipment used for application, frequency, selection of appropriate preservative work required to restore the condition as near to the original as possible/feasible

Specifying the maintenance

Manufacturers instructions, life expectancy of materials/feature, construction materials, uses, weather conditions, frequency of application, application techniques, decontamination/cleaning, costs (materials, labour, expert advice, legal, planning)

Legislation

Current health and safety legislation, environmental legislation, planning legislation and codes of practices pertinent to the construction and maintenance of specified timber features including: decking, steps, bridges, pergolas, arbours, palisades, post and rail fences, gates

Unit 327 Construct and Maintain Timber Landscape Features

Notes for guidance

The learner will be able to develop the skills and knowledge to construct and maintain timber landscape features. They will evaluate the range of materials and techniques and the health and safety implications of this work. They will develop further practical landscape skills acquired at level 2. A greater depth and breadth of technical knowledge and skill is required at this level, including a wide range of materials and their uses. The unit focuses on the features for which timber is particularly appropriate. It covers construction, repair and maintenance of timber features and dealing with the particular problems associated with them.

Outcome 1 covers the construction and repair of horizontal and vertical timber features. Learners will need sufficient time and access to materials and sites to practise these techniques to meet the required standard and carry them out with confidence. They should be familiar with a range of timbers, other materials, construction techniques and features and should be able to select and use them confidently and safely. Learners should be familiar with the techniques required to construct different types of timber features and they must be able to carry out repairs efficiently, including making the feature safe before work begins. The learner must be able to comply with all current, relevant legislation during construction of horizontal and vertical timber features. Learners must recognise how to keep the site safe and tidy during construction, minimise unnecessary waste and unwanted impact to the site and use protection techniques for security and to protect the work until it is ready for use. They should be aware of potential problems during construction work and how to overcome them.

In Outcome 2 learners must demonstrate an understanding of the construction of timber landscape features. This should be achieved by learners evaluating a range of timber features and their uses. Learners will identify and describe typical repairs needed for timber structures and evaluate a range of timber suitable for outdoor use and appropriate timber treatments. Learners will also predict the potential problems that may occur and know how to overcome them.

Outcome 3 enables learners to identify and evaluate the use and effectiveness of paints, water-based and solvent-based preservatives. They will evaluate technical information for specifying the maintenance of timber feature, together with identifying and summarising the environmental and health and safety legislation and the codes of practice relating to the construction and maintenance of timber features. Delivery must provide the learner with the opportunity to develop the breadth and depth of their knowledge and access to up-to-date information, including the Internet, is recommended.

The unit may be delivered by a wide range of techniques, including lectures, video or DVD, supervised practical work, site visits and research. Real projects are a valuable means to boost learners' confidence, technique and understanding, following initial acquisition of the skills. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities and learners must comply with all current legislation.

References

Books

- Brickell, C. 2006. *RHS essential garden planning and construction*. London: Mitchell Beazley
- Derek Lovejoy Partnership. 1997. *Spon's Landscape Handbook*. Oxford: Taylor and Francis.
- Fortlage, C.A., Phillips, E. 1996. *Landscape Construction: Roads, Pavings and Drainage Volume 2*. Surrey: Ashgate Publishing.
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Websites

www.cambridgeshire.gov.uk/leisure/libraries/online/bgsi.htm gives free access to British standards online

Unit 328

Construct and Restore Walls

Level: 3

Credit value: 10

Unit aim

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

The learners will be able to develop the skills and knowledge to construct and restore walls in gardens and the landscape. They will consider the range of materials and techniques, and the health and safety implications of this work.

Learning outcomes

There are **three** learning outcomes to this unit. The learner will:

1. Be able to construct outdoor walls
2. Understand the construction of outdoor walls
3. Be able to restore a wall

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L24.2 Construct free-standing walls

L25.1 Repair and restore walls

CU20.1 Maintain structures and surfaces

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 328

Construct and Restore Walls

Outcome 1

Be able to construct outdoor walls

Assessment Criteria

The learner can:

1. Prepare **effective footings**
2. Construct **free-standing walls**
3. Describe the **security of the site and protection of the work** until it is fit for use
4. Comply with **current legislation** during construction work

Unit content

Effective footings

Identify line, orientation, marking out from a plan, according to specifications (length, depth, width), criteria for determining the size and depth of footings

Free-standing walls

Construct wall with right angle corner, mortared brick (or pre-cast or natural stone or block/screen blocks), stretcher bond, construct as per specification (unit size, bond, single or double brick width, height, length)
Others bonds to be aware of: English bond, Flemish bond, Garden Wall Bond, Open and Random Bond

Security of the site and protection of the work

Ensure a safe, secure site and tidy site, site signage, minimise unnecessary waste, minimise detrimental environmental impact, identification of potential problems, adverse weather conditions, make contingency plans, wearing of appropriate Personal Protective Equipment (PPE), compliance with current health and safety and construction legislation

Current legislation

Comply with current legislation and construction codes of practice, to include Personal Protective Equipment (PPE), Control of Substances Hazardous to Health (2002) (COSHH), manual handling, building and construction standards, staff certificates of competence and other required qualifications, Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1992 (as amended 1999)

Unit 328

Construct and Restore Walls

Outcome 2

Understand the construction of outdoor walls

Assessment Criteria

The learner can:

1. Evaluate **construction techniques** and **specifications** for brick walls, stone walls, dry stone walls and retaining walls
2. Evaluate the uses of **different bonds** for walls, including stretcher, English Flemish, Garden Wall, Open and Random
3. Identify **potential sources of waste**, adverse environmental impact and methods to minimise these
4. Explain typical site **problems and contingencies** for dealing with them

Unit content

Construction techniques, specifications and different bonds

Evaluations to include: specifications, excavation techniques, footings (materials, depth, width), free standing and retaining walls, bond types (stretcher bond, English bond, Flemish bond, Garden Wall Bond, Open and Random Bond)

To include: brick, pre-cast and natural stone, block, screen block, technical data of materials

Potential sources of waste

Waste materials through poor, incorrect and excessive ordering, poor handling or storage, weather damage, waste time through poor systems

Problems and contingencies

To include: site services (known and unknown), soft pockets, permits, unexpected finds, ground pollution, weather conditions (including water logging, frost, snow), boundary disputes, shortage of labour/skills, delays in delivery of materials, equipment/machinery breakdown, inappropriate equipment/machinery on site, contingency plans

Unit 328

Construct and Restore Walls

Outcome 3

Be able to restore a wall

Assessment Criteria

The learner can:

1. Assess the **condition** of a wall
2. Estimate the **requirements for restoration**
3. **Restore** a wall
4. Describe methods of **testing** the safety, stability and durability of walls
5. Summarise the health and safety and other **legislation** and codes of practice pertinent to the construction and restoration of walls

Unit content

Condition

Safety, stability, durability, condition of mortar and bricks/blocks, correct bond for use, missing bricks or sections, weed growth in wall, ivy (Hedera) growth on wall. Work required to restore the condition as near to the original as possible/ feasible

Requirements for restoration

Learners should be able to estimate all the resources involved, including survey and assessment costs, identification of appropriate materials, sourcing of appropriate materials, materials cost (value for money, transportation of goods), labour costs, expert advice, legal/planning costs, equipment/machinery hire

Restore

Carry out restoration safely and to specification, select appropriate materials to include matching bond, brick, pre-cast or natural stone or block, mortar mix (cement, lime, sand, and colour), weather resistance properties, remove any weed or ivy (Hedera) growth

Testing

Technical data, weathering effects (rain, frost, exposure), ground conditions, test methods for safety, stability, durability

Legislation

Comply with current legislation and construction codes of practice, to include: personal protective equipment (PPE), Control of Substances Hazardous to Health (2002) (COSHH, manual handling, building and construction standards, staff certificates of competence and other required qualifications, Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1992 (as amended 1999)

Unit 328 Construct and Restore Walls

Notes for guidance

The learner will be able to develop the skills and knowledge to construct outdoor walls, and be able to assess the condition of existing walls and carry out the required restoration. They will evaluate the range of materials and techniques and the health and safety implications of this work. They will develop further practical landscape skills acquired at level 2. A greater depth and breadth of technical knowledge and skill is required at this level, including a wide range of materials and their uses.

In Outcome 1 learners will have the opportunity to construct walls for outdoor use, laying effective footings and constructing at least one (1) free-standing wall using stretcher bond with a right angle corner using mortared brick (or pre-cast or natural stone or block/screen blocks). Learners must also be aware of other bonds to include English bond, Flemish bond, Garden Wall Bond, Open and Random Bond and possibly Header and Stack bonds. Learners must also demonstrate their ability to describe (and apply) the security of the site and the methods to protect the work until it is fit for use, and comply with current legislation during construction work. They should be aware of potential problems during construction work and identify how to overcome them.

Outcome 2 provides the learner with the opportunity to develop the breadth and depth of their knowledge and understanding of the construction of outdoor walls, namely brick walls, stone walls and dry stone walls. Learners are also to evaluate construction techniques, specifications and requirements of the following Stretcher bond, English bond, Flemish bond, Garden Wall Bond, Open and Random Bond (and possibly Header and Stack bonds) and also screen blocks. They should understand the properties of a range of mortar mixes and additives and identify potential sources of waste, adverse environmental impact and methods to minimise these and explain typical site problems and contingencies for dealing with them.

Outcome 3 covers the practice and theory of the restoration of walls. Learners will need to practise assessing the condition of walls and recommending appropriate restoration and to practise restoration techniques, although these may not necessarily be the same walls. Learners must demonstrate an understanding of how to test walls for safety, stability and durability, being able to describe them and be able to fully cost all aspects of restoration work. They should be able to identify, summarise and comply with all legislation pertaining to the construction and restoration of walls.

The unit may be delivered by a wide range of techniques, including lectures, video or DVD, supervised practical work, site visits and research. Real projects are a valuable means to boost learners' confidence, technique and understanding, following initial acquisition of the skills. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities and learners must comply with all current legislation.

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Books

- Brick Development Association. 2000. *The BDA guide to successful brickwork*. 2nd ed. Oxford: Butterworth-Heineman.
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Websites

www.cambridgeshire.gov.uk/leisure/libraries/online/bgsi.htm gives free access to British standards online

Unit 329

Prepare Landscape and Garden Design Briefs

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to develop the skills and knowledge to negotiate with the client, determine the client's needs and prepare a design brief, letter of engagement and design service. The learner will also learn how to assess the characteristics of sites, including site problems, and prepare a site evaluation and analysis report.

Learning outcomes

There are **five** learning outcomes to this unit. The learner will:

1. Be able to present a fee bid and form of agreement to meet client's requirements
2. Understand procedures to produce a fee bid and form of agreement
3. Be able to undertake site evaluation and analysis
4. Understand site evaluation
5. Understand landscape and garden site problems

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

CU91 Assess the characteristics of sites

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 329

Prepare Landscape and Garden Design Briefs

Outcome 1

Be able to present a fee bid and form of agreement to meet client's requirements

Assessment Criteria

The learner can:

1. Prepare a **questionnaire and site summary checklist** to use on site visits
2. Produce a **brief and letter of engagement**
3. Produce a **design service contract**, including arrangements for work

Unit content

Questionnaire and site summary checklist

Materials produced are appropriate for use by visiting clients, being fit for purpose, to record client's requirements and site data

Questionnaire to include: client's details, garden size, client's requirements and personal preferences, specific plants, materials, features that are required or disliked, architectural details and costs, budgets and payment methods

Checklist to include: climatic and topographical details, plant health and landscape structural defects, site features, changes in level, site and soil conditions-texture, structure, pH, drainage, position of services, access routes, hazards, ownership, boundary and neighbour issues, legislative and planning issues

Brief and letter of engagement

To set out client's requirements, services to be provided, deadlines to be met, costs/fees and payments, conditions of the contract made clear

Design service contract

Arrangements for work should include names and addresses of all parties, description of the work, permissions and approvals, price/fee and full cost, payment details, access and working period, deadlines for completion, insurances and indemnities, disputes, dates and signatures

Unit 329

Prepare Landscape and Garden Design Briefs

Outcome 2

Understand procedures to produce a fee bid and form of agreement

Assessment Criteria

The learner can:

1. Review the range of **techniques** used to determine client's requirements
2. Explain the purpose and components of a garden designer's **fee bid**
3. Explain the **main components** of a garden design contract, including **arrangements for work and contractual conditions**
4. Evaluate **documentation** to aid the process of producing a fee bid and form of agreement, including promotional company leaflets and presentation styles.

Unit content

Techniques

Questionnaires, interviews, site investigations/survey/inventory, functional requirements, desk top, archival and map resources, site opportunities, constraints, attractors and detractors

Fee bid

Designer and company particulars, client and site brief and particulars and letter of confirmation, methodology statements, explanation of the designer's services, scale of charges, fees and methods of payment, form of fee bid and payment method, presentation style.

Main components/ arrangements for work and contractual conditions

Arrangements for work including details of interested parties, description of the work to be done, permissions, consents and regulations approval, availability and use of facilities, price and full costs of the work, payment details, access and working period, guarantees, insurances and indemnities, working hours, occupation and security of the premises, disputes

Contractual conditions, clauses and statements, including designer's responsibilities, customer's responsibilities, health and safety requirements and expectations, change to work/design details, extending the working period, payment details, defects liability period, bringing the contract to an end, insolvency, law of contract and other legal rights

Documentation

Use of promotional company leaflets when dealing with clients, benefits of letter and form of agreement, comparison of presentation styles

Unit 329

Prepare Landscape and Garden Design Briefs

Outcome 3

Be able to undertake site evaluation and analysis

Assessment Criteria

The learner can:

1. Interpret the **physical, biological, cultural, environmental and edaphic characteristics** of a site
2. Produce **site evaluation and analysis reports** including graphic and written formats
3. Report on **landscape and garden site problems**.

Unit content

Physical, biological, cultural, environmental and edaphic characteristics

Site services, topography, aspect, plant species, diversity, wildlife value, age class, plant dimensions and plant health, site uses and location, sources of noise, dust and pollution, exposure, climate and microclimate, soil texture, structure, depth, pH, nutrient status, hydrology and irrigation requirement

Site evaluation and analysis reports

Normally contain detail in graphic and written formats, e.g. plans/ maps/ charts/photographs/images which will be annotated and may be in addition to a written report, sufficiently detailed to facilitate future work on the site

Landscape and garden site problems

Problems that maybe found on site due to failure of hard landscaping or planting, such as plant spacing, plant and material selection, measurement errors/slippage, shade, damage from trees

Unit 329

Prepare Landscape and Garden Design Briefs

Outcome 4

Understand site evaluation

Assessment Criteria

The learner can:

1. Explain **field-based methods** of measuring and recording site characteristics
2. Explain how to **research** aesthetic, urban, rural, site and land classification characteristics
3. Explain the **purpose and procedure** for an environmental impact assessment.

Unit content

Field-based methods

Field-based methods to assess site services, topography, aspect, plant species, diversity, wildlife value, age class, plant dimensions and plant health, site uses and location, sources of noise, dust and pollution, exposure, climate and microclimate, soil texture, structure, depth, pH nutrient status, hydrology and irrigation requirement,

Purposes of site evaluation, methods to analyse and present site characteristics in terms of positive and negative effects, attractors and detractors and through written and graphic reports

Methods of recording to include: photographic, full site survey, interviews, archival research

Research

Methods of researching aesthetic features, boundaries, ownership, access, rights of way and legal and planning restrictions, historical, cultural, current land association and use, space, circulation and linkage, geographic and architectural associations, tree preservation orders, local planning laws

Purpose and procedure

Purpose and procedure for environmental impact assessment and when it is appropriate for this to be undertaken

Environmental Impact Assessment (EIA): an assessment of possible impact, could be positive and/or negative, consider natural, social and economic aspects, procedure to ensure that environmental consequences of proposed works/projects are identified and assessed, may involve public consultation

To note for large projects: The EIA Directive (EU legislation) introduced in 1985 and amended in 1997

Unit 329

Prepare Landscape and Garden Design Briefs

Outcome 5

Understand landscape and garden site problems

Assessment Criteria

The learner can:

1. Describe the **causes of failure** in hard and soft landscape features
2. Evaluate the **causes of aesthetic problems** and a range of possible solutions
3. Evaluate the **causes of site-based environmental problems** and a range of possible solutions.

Unit content

Causes of failure

Sub-grade failure, incorrect construction/maintenance techniques, poor or incorrect initial choice of materials, change of use, change of environmental conditions, overspend (exceeding budget), adverse weather conditions
Pest and disease problems, nutrition problems, unsuitable selection for prevailing conditions, incorrect planting, spacing, establishment and/or maintenance techniques, change of use, change of environmental conditions, change of ownership and no longer suitable

Causes of aesthetic problems

Issues beyond the site boundaries including near and distant unpleasant/unsightly view(s), neighbouring boundaries, internal issues including utility areas, services, boundary structure and access points, architectural issues including the building style, fittings and decoration, garages, greenhouses, sheds and outhouses, lack of unity, compatibility, stimuli, scale, proportion, colour, texture, harmony, balance, symmetry/asymmetry, form, shape, space, enclosure, movement, rhythm, focal points and conformity in soft and hard landscape features.
Failure to meet site and client's requirements, functionality inappropriate, poor maintenance

Causes of site-based environmental problems

Drainage issues, irrigation requirements, microclimatic conditions, soil based problems, pollution based problems, previous land use, cultural issues such as vandalism, overuse, excessive wear and tear, hostile environments such as coastal, urban and road side areas, poor wildlife value

Unit 329 Prepare Landscape and Garden Design Briefs

Notes for guidance

This unit is designed to equip the learner with the skills to negotiate with the client, determine the client's need and to prepare a brief, letter of engagement and design service contract. The learner will also develop the skills to assess the characteristics of sites, produce a site evaluation and analysis report and obtain all the information required to be able to specify work.

In Outcome 1 the learner is expected to be able to accurately produce various documentation necessary to facilitate clarity in negotiations with the client and determination of the client's need and the opportunities and constraints of the site. Learners must produce a client questionnaire and site summary checklist to use on an actual or simulated site visit, a brief and a letter of engagement and a design service contract which must include details and arrangements for the work. Every opportunity to work on 'real' projects should be taken, so that learners acquire a thorough understanding of the processes, procedures and possible pitfalls relating to these tasks.

Outcome 2 covers the need for learners to understand the procedures required to produce a fee bid and form of agreement. Learners must demonstrate that they are able to review the range of techniques used to determine client's requirements for a specified site project and explain the purpose and identify the components of a garden designer's fee bid. They must be able to identify the main components of a garden design contract, including arrangements for work and contractual conditions. They will then need to carry out an evaluation of the documentation used to aid the process of producing a fee bid and form of agreement, including promotional company leaflets and presentational styles.

In Outcome 3 the learner will carry out a site evaluation and analysis. Learners must demonstrate the ability to interpret the physical, biological, cultural, environmental and adaphic characteristics of a specified site, possibly as part of an integrated project which covers combined aspects of this unit. Learners must also produce for a specified area a site evaluation and analysis report, which is to include both graphic and written formats, together with producing a report on identified landscape and garden design problems which may be encountered on the site. Wherever possible a range of 'real' sites should be used to enable to learner sufficient practice and to experience a wide range of sites displaying different characteristics. This experience will help the learner to develop a deeper understanding of the processes involved and the opportunities and constraints relating to specific sites.

Outcome 4 covers the ability of the learner to understanding site evaluation, enabling the learner to identify and explain field-based methods for measuring and recording varied site characteristics, features and data. They are required to demonstrate an ability to identify and explain how to research aesthetic, urban, rural and land classification characteristics as well as explaining the purpose and procedures for carrying out an Environmental Impact Assessment (EIA). The learners should be required to carry out an EIA on a specified site, which could be linked to an on going piece of work. Learners should be aware of the EIA Directive (EU legislation) introduced in 1985 and amended in 1997 for large high impact projects.

In Outcome 5 learners will be assessing and evaluating landscape and garden site problems. This could be done as part of a normal site evaluation or where a designer is brought in to deal with a specific problem by the client. Learners are required to predict and describe the likely causes of failure in hard and soft landscape features/projects, identify and evaluate the causes of aesthetic difficulties which may be experienced and evaluate the likely causes of site-based environmental problems and produce a range of possible solutions, having in mind the EIA.

The unit may be delivered by a wide range of techniques, including lectures, video or DVD, supervised practical

Unit 329

Prepare Landscape and Garden Design Briefs

Outcome 5

Understand landscape and garden site problems

work, discussions, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities. Wherever

possible a range of 'real' sites should be used. This will help the learner to develop a deeper understanding of the processes involved and the opportunities and constraints relating to specific sites.

References

Books

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Unit 330

Understand the Principles and Practices of Landscape and Garden Design

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to develop the skills and knowledge to take the results of site analysis and client brief and produce a range of concept plans to suit the situation. They will also be able to develop these plans into formal presentation plans and present them to the client. The plans include plan, elevation, projection and perspectives and a variety of graphic presentation formats is explored.

Learning outcomes

There are **five** learning outcomes to this unit. The learner will:

1. Understand the elements and principles of design as they relate to landscape and garden design
2. Be able to produce landscape and garden design plans
3. Understand the production of concept plans
4. Be able to produce a range of plans and visualisations
5. Understand the production and delivery of presentation plans and visualisations to the client

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

CU85 Design landscape areas and specify materials and components

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 330

Understand the Principles and Practices of Landscape and Garden Design

Outcome 1

Understand the elements and principles of design as they relate to landscape and garden design

Assessment Criteria

The learner can:

1. Evaluate **hard and soft landscape materials and features** and their uses
2. Describe methods of **positioning** hard and soft features to meet the needs of the site and the client.

Unit content

Hard landscape materials and features

Fences, pergolas and trellis work, water features, garden buildings (summer houses, sheds, pavilions, arbours, gazebos, conservatories and greenhouses), paved surfaces, patios and timber decked areas in brick, stone concrete, slabs, macadam, tiles, bitmac, aggregates, types of timber for different purposes, finishes to surfaces, historic structures, sculpture and landscape art, vertical surfaces, brick walls, block-work, rendered work, free standing and retaining structures, stone, bonded and inbound walls and finishes

Uses will include, aesthetic, plant support, protected growing, wildlife, aquatics, storage, leisure, security, privacy

Soft landscape materials and features

Orientation, formal, informal, organic, architectural and deconstructed designs, herbaceous perennial uses, mixed and shrub borders, seasonal bedding schemes (spring, summer, plunge, carpet), groundcover, container planting, ornamental trees, avenues, belts and copses, hedges (formal, informal), screens, shelter belts and wind breaks, grassed and turfed features, naturalised plantings, including bulbs, historic features including topiary and green architecture, roof gardens and green roof systems, top and soft fruit

Uses: aesthetic, edible, security, privacy, shelter, shade, weed control, collections, tourism, maintaining and encouraging diversity

Positioning

Functional requirements, seasonal aesthetic requirements, shelter, security, shade, access and creation of an entrance, boundary definition, space, enclosure and partial enclosure, screening and partially revealing, focal points, framing views and vistas, taking the eye on and creating mystery, tricks of perspective, soften hard features, specimen decorative, group/clump and mass effect planting, formal, informal and naturalistic arrangements, traditional and contemporary arrangements

Unit 330

Understand the Principles and Practices of Landscape and Garden Design

Outcome 2

Be able to produce landscape and garden design plans

Assessment Criteria

The learner can:

1. Produce **concept plans** for a variety of locations, situations and functions
2. **Enhance and develop** concept plans.

Unit content

Concept plans

For different locations, situations and functions; record and set out initial ideas to include, styles, heights, levels, screens, shading, views, focal points, main features, buildings, path layout/desire lines

Enhance and develop

Sketch designs/plans; photographs, audio and visual recordings, images, annotations; reflection on original ideas, evolution of ideas; inclusive of materials/plants/structures/focal points; discussion with client; review clients brief; enhancement/development of concept plans

Unit 330

Understand the Principles and Practices of Landscape and Garden Design

Outcome 3

Understand the production of concept plans

Assessment Criteria

The learner can:

1. Explain how to produce **garden design proposals** and present ideas to clients
2. Evaluate **research and graphic techniques** available to develop design concepts
3. Describe how to evaluate the **suitability of designs** against clients' requirements.

Unit content

Garden design proposals

Garden design proposals derived from the site survey, sketch designs/plans and annotations, base plan and location plan, site inventory and evaluation

Ideas will be developed through concept (synthesis) and design explanation, design development, preliminary plans and costs, master plans to include presentation drawings, details, sections, colour rendering, perspectives and projections, construction and working drawings including planting plans, photographs/images, setting out plans

Research and graphic techniques

By background research, experimentation, sources of information to include magazines, periodical, books, archived material, museums, boundaries, ownership, access, rights of way and legal and planning restrictions, historical, cultural, current land association and use, space, circulation and linkage, geographic and architectural associations, tree preservation orders, local planning laws, garden and site visits, working from the brief, formal, informal and organic influences, historic and contemporary styles, philosophical and functional influences
Development in structure, features and plantings in contemporary and historical landscapes and garden design

Graphic techniques to include, sketch designs, base and presentation plans, cross section and elevation plans, geometric grids and forms, naturalistic/organic grids and forms, acute, eccentric, distorted and deconstructed grids and forms

Suitability of designs

Clients brief, client's questionnaire, expectations of client, structure, purpose, site inventory, site data, budget, soft and hard landscape materials, use of materials

Unit 330

Understand the Principles and Practices of Landscape and Garden Design

Outcome 4

Be able to produce a range of plans and visualisations

Assessment Criteria

The learner can:

1. Produce **presentation plans** in a variety of media
2. Produce **elevations, projection plans and 1 point perspectives** in a variety of media

Unit content

Presentation plans

Production of presentation plans, draughting, use of standard notations, north point and scale symbols, colour rendering techniques, use of hierarchy of line and shade to aid clarity, handwritten and printed text, scale, frames, borders, mounts and backgrounds, Computer Aided Design (CAD) techniques

Elevations, projection plans and 1 point perspectives

Production of scaled elevations, projection plans and 1-point perspectives accurately and neatly Draughting: use of standard notations, north point and scale symbols, colour rendering techniques, use of hierarchy of line and shade to aid clarity, handwritten and printed text, scale, frames, borders, mounts and backgrounds, computer aided design techniques

Unit 330

Understand the Principles and Practices of Landscape and Garden Design

Outcome 5

Understand the production and delivery of presentation plans and visualisations to the client

Assessment Criteria

The learner can:

1. Evaluate **drawing effects, methods, marks and techniques** for drawing and annotation
2. Evaluate **graphic, audio-visual and computer aided presentation formats** and verbal presentation techniques
3. Explain the purpose of **supporting documentation** for design presentations.

Unit content

Drawing effects, methods, marks

Graphite and charcoal, pens and inks, coloured and non coloured pencils, watercolours and acrylics, marker pens and felt-tip pens, Computer Aided Design (CAD), papers and surfaces

Use of drawing equipment (parallel motion, set square, circle template, compass), labelling (letter size, hand or word processed text), handwritten and printed text, invented graphics

Techniques

Freehand illustration, technical drawing, including plans, elevations, 1-point perspectives and axonomic projections, drawing aids such as stencils, stamps, templates, transfers, photographs, Computer Aided Design (CAD), graphic symbols including hard and soft landscape and site conventions, standard notations, outline, habit and texture symbols, ground cover and mass effect symbols, colour rendering techniques

Graphic, audio-visual and computer aided presentation formats

Paper, surface and media selection, selection of appropriate illustrations, plan annotations, overlays, story boards, base/master/presentation/elevation plan, style (historical, traditional, abstract, contemporary), hierarchy of line and shade to aid clarity, scale, frames, borders, mounts and backgrounds, audio-visual and computer aided presentation format

Supporting documentation

Design explanation, planting/material/resource lists, details and sources of supply, construction/working drawings, photographs, specifications, bills of quantity, contracts, layouts, written reports and assessments, clients brief, clients questionnaire, site survey/inventory

Unit 330

Understand the Principles and Practices of Landscape and Garden Design

Notes for guidance

This unit is designed to equip the learner with the skills and knowledge required to take the results of site analysis and client brief and produce a range of concept plans to suit the situation. They then develop these into formal presentation plans, using a variety of media and present these to the client. The plans include plan, elevation, axonomic projection and 1-point perspectives.

In Outcome 1 learners will explore the elements and principles of design and demonstrate an ability to evaluate an extensive range of hard and soft landscape features and materials and their uses. They will also explore the positioning of hard and soft landscape features according to site, its history, existing features, selected plant material, functions and clients' requirements.

In Outcome 2 learners will take the results of site investigations and client briefs and develop ideas for the site design, producing, enhancing and developing concept plans, in order to then produce landscape and garden design plans. Wherever possible a range of 'real' sites should be used to enable to learner sufficient practice and to experience a wide range of sites displaying different characteristics. This experience will help the learner to develop a deeper understanding of the processes involved and the opportunities and constraints relating to specific sites. Learners must produce a minimum of three (3) concept plans for different locations, situations and functions to satisfy customer/client requirements. Concept plans are a means of recording initial ideas for a site. They should deal with broad concepts such as height needed here, a screen needed there and something to hide an unsightly view. The plans should be able to be produced relatively quickly and should not show intricate detail. They should allow the designer to try out different ideas for the same site and will form the basis of discussion with the client

In Outcome 3 learners must demonstrate their understanding of the production of concept plans and will be able to develop two (2) garden design proposals by background research and experimentation, using sources of information such as magazines, periodical, books, archived material, garden and site visits and by working from the brief. Learners must be able to evaluate research and graphic techniques that are available and have been utilised to develop design concepts. They must also be able to describe and evaluate the suitability of an existing design against the clients requirements set out in a brief.

In Outcome 4 the learner will practice producing presentation plans and supplementary documentation. They will need sufficient time for practice to develop the necessary level of skill and access to draughting facilities. They will explore and experiment with a range of styles and techniques in draughting and lettering. The learner must produce plans using a variety of media. Sites must be a minimum of 300m² in order to provide scope and realism.

Outcome 5 requires learners to understand the range of presentation techniques available and demonstrate that they are able to select suitable methods of presentation to clients. They must have the opportunity to practise these techniques. Learners will need to be provided with opportunity to identify and evaluate the following, drawing effects, methods, marks and techniques, together with graphic, audio-visual and computer aided presentation formats. They must plan for, and undertake, a verbal presentation of proposals to a client and evaluate the outcome(s). The client could be a peer or staff member simulating the client role. Learners must also be able to provide examples and explain the purpose of supporting documentation for design presentations.

The unit may be delivered by a wide range of techniques, including lectures, video or DVD supervised practical work, discussions, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental

Unit 330

Understand the Principles and Practices of Landscape and Garden Design

Notes for guidance

issues. Risk assessments must be undertaken prior to practical activities.

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Websites

www.rhs.org.uk

The Royal Horticultural Society

Unit 331

Understand the Principles of Advanced Horticultural Science

Level: 3

Credit value: 10

Unit aim

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

This unit enable learners to develop knowledge of the structures and complex processes that take place in the plant and soil and their relationship to plant growth. Learners will be able to relate advanced horticultural practices to these processes and understand how environmental conditions affect the growth and development of plants. Learners will need to study 'Understand the Principles of Plant Science' and 'Understand the Principles of Soil Science' at level 3 before embarking on this unit.

Learning outcomes

There are **five** learning outcomes to this unit. The learner will be able to:

1. Understand the physiology of flowers and seeds
2. Understand the principles and processes of plant growth regulation
3. Understand plant breeding and genetics
4. Understand plant adaptations in response to environment
5. Understand the characteristics and classification of soils

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 331

Understand the Principles of Advanced Horticultural Science

Outcome 1

Understand the physiology of flowers and seeds

Assessment Criteria

The learner can:

1. Describe **photoperiodism** in relation to flowering and other plant processes
2. Explain the processes of **dormancy** in buds and seeds, **vernalisation** and maturation of seeds and fruit
3. Describe the stages and processes involved in **germination** including breaking dormancy where applicable

Unit content

Photoperiodism

Description of the phenomenon of photoperiodism, short day, long day (and day neutral plants), in some angiosperms, flowering a response to changing length of day and night, promotes cross pollination, some plants can only be grown in certain latitudes, day neutral plants not regulated by photoperiod, bud and seed dormancy

Dormancy

Reasons for dormancy in buds, changes in the balance of plant growth regulators (hormones), environmental influences (cold, heat, light), cold requirement to initiate or accelerate flower buds

Reasons for dormancy in seeds, physical and physiological dormancy, immature embryos, seed storage, seed viability and testing, methods of breaking dormancy in seeds to include: stratification (exposure to cold), scarification (physical and chemical), provision of light, heat, moisture

Vernalisation

Process of vernalisation in seeds and bulbs and how it can be manipulated by the grower, cold requirement, initiates/accelerates flowering/ breaking of seed dormancy

Germination

Stages and processes involved in germination, germination in gymnosperms and angiosperms (monocotyledons and dicotyledons, seed viability, structure of seeds (endospermic, non-endospermic), hypogeal and epigeal germination, breaking dormancy, environmental conditions required for successful germination

Unit 331

Understand the Principles of Advanced Horticultural Science

Outcome 2

Understand the principles and processes of plant growth regulation

Assessment Criteria

The learner can:

1. Explain the **responses to and interactions** of natural plant hormones (plant growth regulators)
2. Review the effects of **synthetic plant growth regulators**

Unit content

Responses to and interactions

Auxin, cytokinin, gibberellin, abscissic acid, ethylene, defoliants, growth inhibitors/retardants, growth stimulators, links with plant physiology of these individually and in combination, plant responses to specific balances of growth regulators (formation of stems, leaves, buds, flowers, development and ripening of fruit, shedding of leaves)

Synthetic plant growth regulators

The range available and specific purposes to include e.g. rooting, tissue culture (micro-propagation), fruit set, ripening, dormancy and breaking dormancy in buds and seeds, defoliants, growth inhibitors/retardants, growth stimulators

Unit 331

Understand the Principles of Advanced Horticultural Science

Outcome 3

Understand plant breeding and genetics

Assessment Criteria

The learner can:

1. Describe the processes of **mitosis and meiosis** in plants
2. Describe **Mendel's laws** of inheritance, segregation, dominance and recessive
3. Evaluate the uses of **genetic manipulation and tissue culture** in **plant breeding**

Unit content

Mitosis and meiosis

Cell division, similarities and differences, comparison of the two processes

Mendel's Laws

Mendel's laws of inheritance, segregation, dominance and recessive, experiments that can demonstrate these

Genetic manipulation and tissue culture

Uses of genetic manipulation in horticulture, principles of tissue culture, including meristem cuttings, somatic embryos, tissue culture (micropropagation)

Plant breeding

Principles of plant breeding, comparison of the objectives of the breeder, plant producer and end user, current breeding objectives of new cultivars in a specific horticultural situation, eg turf grass species, broad-leaved plants. Organisations involved in plant breeding
Characteristics and production of F_1 hybrids, F_2 hybrids and open pollinated plants, intra-specific, bi-specific and bi-generic hybrids

Unit 331

Understand the Principles of Advanced Horticultural Science

Outcome 4

Understand plant adaptations in response to environment

Assessment Criteria

The learner can:

1. Describe the variations in **plant physiology** in relation to environment
2. Review the diversity of **floral structure** and its relationship with pollinator agents
3. Review the diversity of **vegetative structure** in response to environmental conditions

Unit content

Plant physiology

Environmental factors to include, light, humidity and carbon dioxide levels, shelter, rainfall/irrigation temperature of specific horticultural situations, relate to physiological processes including photosynthesis, respiration, transpiration (cuticular and stomatal), osmosis, how to improve ambient conditions, variations in plant physiology (including C3/C4 plants), Crassulacion Acid Metabolism (CAM), photorespiration, drought survival strategies

Floral structure

Floral formulae, floral morphology and related pollination agents, use of a flora to determine the family of a plant, adaptations, colourations, size, scent, flowering period, reproductive structure, terms (calyx, sepals, corolla, petals, stamens, stigma, ovary, ovules)

Vegetative structure

Variations and adaptations of stem, leaves, flowers and roots and how each modification aids survival in the wild

Environmental conditions to include, high and low humidity, temperature, light and carbon dioxide level, frozen soils, pH, nutrient, dry/wet soils, climbing/support, pollination

Unit 331

Understand the Principles of Advanced Horticultural Science

Outcome 5

Understand the characteristics and classification of soils

Assessment Criteria

The learner can:

1. Explain the **cultivations and management techniques** that are appropriate to soils of different classes
2. Explain the **nitrogen and calcium cycles** and the role of soil texture, structure, pH and cropping on the **availability of nutrients**

Unit content

Cultivations and management techniques

Governed by: soil type, structure, texture, drainage, moisture holding capacity, depth, consolidation, tilth, nutritional status, pH, organic matter levels, stability, and freedom from pests and diseases

Cultivation requirements (hand/mechanised): reasons and benefits, primary and secondary cultivations including single and double digging, sub-soiling, incorporation of organic matter, surface cultivations to include raking, weed control (reasons and methods), amendment of pH levels, application of lime, application of fertiliser (base/top dressing), level seedbed and/or planting bed preparation, post-harvest cultivation and clearance, green manures, crop rotation

Nitrogen and calcium cycles and availability of nutrients

Nutrient cycles (nitrogen/calcium), cation and anion exchange, effects of pH, soil texture, structure and cropping on nutrient availability

Cation (positive charged ion), Anion (negatively charge ion), nutrient/chemical reactions

Exchange of cations, held by soil, affect on nutrient uptake, soils capacity to hold nutrients, Cation Exchange Capacity (CEC) determined by amount of clay/humus a soil contains, a measure of soils fertility role of soil water/texture/organic matter content of soils

Availability of nutrients, specific nutritional disorders related to pH, calcicole and calcifuge, lowering and raising the pH

Relationship between plant nutrition and development

Unit 331 Understand the Principles of Advanced Horticultural Science

Notes for guidance

This unit enable learners to develop knowledge of the structures and complex processes that take place in the plant and soil and their relationship to plant growth. Learners will be able to relate advanced horticultural practices to these processes and understand how environmental conditions affect the growth and development of plants. Learners will need to study 'Understand the Principles of Plant Science' and 'Understand the Basic Principles of Soil Science' at level 3 before embarking on this unit.

Outcome 1 covers photoperiodism, dormancy in seed and buds and the germination of seeds. A thorough understanding of the principles involved is required of the learner. It is also important that learners can relate the scientific principles to horticultural practices therefore opportunities should be sought to ensure a practical approach, involving for example being responsible for growing photoperiodic plants, collecting seed and breaking dormancy, together with sowing a range of seeds to better appreciate the germination process. Learners must demonstrate an understanding of the physiology of flowers and seeds, by being able to describe photoperiodism with reference to specific plant examples and identifying and explaining the process of dormancy in seeds and buds. They must also be able to identify and describe the stages and processes involved in germination for a range of seed types.

Outcome 2 covers the understanding of the principles and processes of plant growth regulation both those occurring naturally and those being induced artificially. Learners will need to explain the responses to, and interactions of, identified natural plant hormones (plant growth regulators) and carry out a review of the effects of specific synthetic plant growth regulators used to control various aspects of plant growth and development. Learners should be able to recognise the uses and advantages of using growth inhibitors/retardants and growth stimulators in specific plant types.

Outcome 3 covers the learner's ability to understand plant breeding and genetics, including describing (and differentiating between) the processes of mitosis and meiosis. Learners will be aware of Mendel's laws of inheritance, together with carrying out an evaluation of the uses of genetic manipulation and tissue culture in plant breeding and propagation. Learners must also identify the characteristics and production methods of F₁ hybrids, F₂ hybrids and open pollinated plants, together with bi-specific (inter-specific) and bi-generic hybrids.

In Outcome 4 learners will need to identify and understand the many plant adaptations which have occurred in response to the environment in which they grow. This should be related to the plants physiological processes including photosynthesis, respiration, transpiration (cuticular, stomatal) and osmosis. Learners must review the diversity of floral structure and its relationship with pollinator agents and the diversity of plant vegetative structures in response to environmental conditions. Learners must use floral formulae which should be clearly linked to the learner's ability to determine plant relationships and the family of a plant. Vegetative adaptations identified should include those of stems, leaves, flowers and roots and how each modification aids survival in the wild should be understood.

Outcome 5 covers the development of the learners understanding of soil classification, management techniques for soils of different classes, nutrient cycling and availability of nutrients. This must include cation exchange capacity since it is the exchange of cations held by soil that affects nutrient uptake, it should also be recognised that the Cation Exchange Capacity (CEC) is determined by amount of clay/humus a soil contains.

The learner should be able to identify the soil classification from a soil profile and recommend suitable horticultural uses and soil management strategies, inclusive of cultivation techniques that may be used either by hand or by mechanical means, as well as additions which may be made to a soil to improve its structure and

Unit 331

Understand the Principles of Advanced Horticultural Science

Outcome 5

Understand the characteristics and classification of soils fertility. The learner should be able to discuss the factors affecting the nutritional status of the soil. The horizons identified in the soil profile must include, O - organic layer, A - topsoil, B - subsoil, C – (parent

material) bedrock, winter water table, drainage characteristics. The profile pit, must extend to a sufficient depth to expose soil profiles O, A, B, and C

The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, experimentation, investigations using microscope slides and sections, discussions, video or DVD, site visits and research. The delivery of this unit may be integrated with the delivery of other units where this is feasible and every opportunity should be taken to show the link to horticultural practices. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

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Books

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Unit 332

Construct and Establish Sports and Amenity Turf Areas

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of how to construct and establish sports and amenity turf areas and how these can be applied in practice. This unit is primarily aimed at learners within a centre- based setting looking to progress into the sector or further education and training.

The learner will be able to develop skills and knowledge involved in the preparation and construction of sports and other turf surfaces, including investigation of suitable site, grading, drainage, land cultivation and establishment of the sports or amenity turf surface.

Learning outcomes

There are **five** learning outcomes to this unit. The learner will:

1. Be able to investigate and survey a site for a new sports or amenity turf area
2. Understand the principles of grading and drainage
3. Understand the construction and preparation of land for sports turf construction
4. Understand the use of artificial or ameliorated rootzones and specialised constructions
5. Be able to establish swards from seed and turf

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

- L19.1 Set out and mark sites ready for operations
- L19.5 Establish grass swards
- L23 Prepare sites for landscape construction and installation

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 332

Construct and Establish Sports and Amenity Turf Areas

Outcome 1

Be able to investigate and survey a site for a new sports or amenity turf area

Assessment Criteria

The learner can:

1. Carry out a **site investigation** and report on its suitability for summer and winter uses
2. Carry out and plot a **survey** using appropriate equipment
3. Describe acceptable surface levels for winter and summer sports

Unit content

Site investigation

Choice and location of site, soil, topography, drainage/signs of poor drainage, services, levels, access and planning for a range of winter and summer use, e.g. football, cricket, bowls

Survey

Surveying terms, equipment used (range poles, tapes and lines, straight edge, boning rods, optical and laser levels), methods, plotting, recording and plotting areas, boundaries, existing features and levels

Unit 332

Construct and Establish Sports and Amenity Turf Areas

Outcome 2

Understand the principles of grading and drainage

Assessment Criteria

The learner can:

1. Describe the techniques of **major and minor grading** and **equipment** used for grading and earth movement
2. Review the suitability and layouts of types of **drainage systems** appropriate to turf areas
3. Explain the **12 month and routine aftercare** for drainage systems appropriate to turf areas

Unit content

Major and minor grading and equipment

Principles of removal of topsoil and 'cut and fill', effects of stacking of topsoil and moisture content of soils/structure loss during operations

Tractor mounted or trailed equipment, excavators, back-hoes, bulldozers, graders, levellers and rollers

Site marking to facilitate operations, health and safety considerations

Benefits of grading

Drainage systems

Benefits of drainage systems

Layouts, uses, and installation of sub-soiling, mole ploughing, open ditches, piped drainage systems, sand slitting

12 month and routine aftercare

For open ditches, piped drainage systems, sand slitting

Unit 332

Construct and Establish Sports and Amenity Turf Areas

Outcome 3

Understand the construction and preparation of land for sports turf construction

Assessment Criteria

The learner can:

1. Review methods of assessing the condition of the soils
2. Describe **methods and purposes** of land clearance, primary and secondary cultivations, and equipment that may be used
3. Explain the **establishment** of swards from seed and turf for defined turf types and standards

Unit content

Methods and purpose

Chemical and cultural methods of land clearance: techniques and purposes of primary and secondary cultivations to ensure correct tilth levels and degree of consolidation, effect of poor/uneven consolidation of subsequent use and levels, health and safety considerations

Establishment

To meet the requirements for at least football, cricket, bowls

Seed mixtures to suit use and soil type/turf types, application rates, treatments, aftercare to establishment

Unit 332

Construct and Establish Sports and Amenity Turf Areas

Outcome 4

Understand the use of artificial or ameliorated rootzones and specialised constructions

Assessment Criteria

The learner can:

1. Describe **specialised constructions** for specific uses
2. Evaluate the use and **composition** of **artificial or ameliorated rootzones** in specific sports

Unit content

Specialised constructions

Systems for combined drainage and sub-irrigation, sand/gravel raft systems, construction of cricket table and golf green

Composition

Natural soil football pitches, sand football pitches, golf/bowling greens, cricket pitches

Artificial or ameliorated rootzones

High sand pitches for winter sports, use of clay for cricket and tennis, reinforcement systems (e.g. fibre sand, polypropylene fibres, honeycomb systems for occasional use car parking)

Unit 332

Construct and Establish Sports and Amenity Turf Areas

Outcome 5

Be able to establish swards from seed and turf

Assessment Criteria

The learner can:

1. Select an appropriate **seed mix and application rate** for specified use
2. Prepare land safely for **sowing grass seed or laying turf**
3. Establish grassed areas safely from **seed and turf**
4. Assess the **quality** of delivered turf for a specific use

Unit content

Seed mix and application rate

Species and cultivar mixes and application rates for specific uses according to soil and weather conditions

Sowing grass seed or laying turf

Primary and secondary cultivations to ensure correct tilth, levels and degree of consolidation

Seed and turf

Learners should be able to sow grass seed evenly and at a stated density and rake it lightly into the surface. They should be able to lay turf without stretching, with a firm edge, without small pieces at the edge and the joins top-dressed. They should provide immediate aftercare and protection

Quality

Turf for the purpose: species mix, sward colour, absence of weeds, pests and diseases

Unit 332 Construct and Establish Sports and Amenity Turf Areas

Notes for guidance

This unit is designed to equip the learner with the skills and knowledge involved in the preparation and construction of sports and other turf surfaces, including investigation of suitable site, grading, drainage, land cultivation and establishment of the sports or amenity turf surface.

In Outcome 1, learners will develop skills and knowledge in assessing the suitability of sites for specific purposes. They will learn techniques of surveying a large area and recording the data. They will develop skill and knowledge of a range of survey equipment and the situations in which each type is useful. They will understand acceptable features and surface levels for a range of winter and summer uses. It will be essential that learners work with a real site of at least the size of a football pitch. It is advisable to use the same site as the basis for study in outcomes 2 and 3.

In Outcome 2 learners will study the principles of grading and drainage and be able to apply to knowledge to specific sites. Visits to contractors and/or sites where construction/grading/drainage is taking place will be particularly helpful.

In Outcome 3 learners will develop knowledge of assessing the status of the soil for specific purposes, methods of land clearance and primary and secondary land cultivations. Large-scale and small-scale methods should be included and emphasis should be put on the reasons for the various operations. The establishment of swards from seed and turf for specific purposes is also included and this should focus on species and cultivar mixes for specific purposes and soil types, suitable application rates of seed and types of turf available. These should be linked to the types and standards of turf required.

In Outcome 4 artificial and ameliorated rootzones are considered, which should include specific rootzone layers for special constructions such as a cricket table or sand raft construction and rootzone materials and grades of materials. Sports Turf Research Institute (STRI) literature will be particularly useful for this outcome.

In Outcome 5 learners will develop skills in land cultivation and establishment of turf, and apply knowledge gained in outcome 3. The learner is expected to be able to carry out these tasks using hand/small scale techniques, but will require knowledge of techniques for large-scale projects in order to complete outcome 3.

The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, site visits and research. Learners will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. All methods should reinforce the importance of health and safety and environmental issues. Risk assessments must be undertaken prior to practical activities.

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BS 3882: 2007 Specification for topsoil

BS 3969: 1998 Recommendations for Turf for general purposes

BS 4422: 1989 Code of Practice for general landscape operations (excluding hard surfaces)

STRI leaflets and Journals

Websites

www.iog.org

The Institute of Groundsmanship

Unit 333

Understand the Principles of Sustainable Management of Turf

Level: 3

Credit value: 5

Unit aim

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

The learner will be able to develop the skills and knowledge involved in the sustainable management of sports and amenity turf areas. The learner will be able to analyse and evaluate data to make informed turf management decisions.

Learning outcomes

There are **three** learning outcomes to this unit. The learner will:

1. Understand the principles of sustainable turf management
2. Be able to analyse and evaluate turf management information
3. Understand turf management strategies in relation to the sustainability of the surface

Guided learning hours

It is recommended that **30** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC and The Institute of Groundsmanship.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 333

Understand the Principles of Sustainable Management of Turf

Outcome 1

Understand the principles of sustainable turf management

Assessment Criteria

The learner can:

1. Define the terms **sustainability** and **carrying capacity**
2. Explain benefits and limitations and **management strategies** in sustainable management
3. Evaluate the effects that **components of the soil ecosystem**, usage patterns and weather conditions have on the carrying capacity
4. Explain how **water** and material inputs can be managed sustainably.

Unit content

Sustainability

Long lasting, responsible and a balanced approach to turf management, utilising efficient and effective use of resources and minimising waste

High resource inputs can conflict with the principle of sustainability

Management of material inputs include reducing needs, reuse and recycling

Carrying capacity

The maximum level of use or activity of a sports or amenity surface that can be supported without causing an unacceptable deterioration of the surface or reduction in playing quality or user experience

Management strategies

Inputs, choice of equipment and machines and season of use, frequencies, duration, direction of travel, rotation and intensity of utilised areas, sequence of different operations, focusing on high-wear areas

Components of the soil ecosystem

Mineral and organic matter, soil air, soil water, nutrient and pH status, soil organisms

Water

Water: sources of supply; quality and quantity of supply; use of grey water.

Unit 333

Understand the Principles of Sustainable Management of Turf

Outcome 2

Be able to analyse and evaluate turf management information

Assessment Criteria

The learner can:

1. Collect and evaluate turf management information using **Performance Quality Standards**
2. Analyse turf management information using **efficiency ratios** to inform management practices for improvement
3. Identify **local climate data** for a specific location and recommend turf management activities
4. Estimate the **cost savings or additional costs** of material inputs to improve the sustainability of turf surfaces

Unit content

Performance Quality Standards

Levels of Performance Quality Standards: basic (recreational use), standard (club use) and high (national and international competition use)

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, ball roll, spin, hardness

Efficiency ratios

Cost per hour of use, cost per game, cost per user, cost per unit area (e.g. square metre or hectare) input (labour hours), per unit output (hour of use or game), input (material quantities), per unit output (hour of use or game)

Local climate data

Current season information compared with longer term averages, quantity of precipitation, quantity and quality of light, shading effects, seasonal and unseasonal frost, maximum and minimum temperatures, air movement, endemic and catastrophic climatic events

Impact upon management decisions, quality of turf surface, grasses species selection, irrigation, fertiliser application, mowing specifications, sequence of operations, pests, diseases and disorders, frequency and intensity of use

Cost savings or additional costs

Costs: topdressing, seed, turf, water, fertiliser, energy, labour, machinery, finance

Unit 333

Understand the Principles of Sustainable Management of Turf

Outcome 3

Understand turf management strategies in relation to the sustainability of the surface

Assessment Criteria

The learner can:

1. Evaluate the **benefits and use** of Performance Quality Standards
2. Relate the **quality objectives** of a turf surface to resource inputs and usage
3. Explain the **advantages and disadvantages of using efficiency ratios** when evaluating a turf surface
4. Explain how mowing and other **maintenance practices** impact on sustainability

Unit content

Benefits and use

Benefits: inform management decisions, determine maintenance requirement accurately, justify purchase of equipment/ resources, effective use of inputs, reduced wastage, determine the carrying capacity of the turf Use: distinguish between different levels of quality and decide which is acceptable

Quality objectives

Levels of Performance Quality Standards: basic, standard and high

Requirements of the surface for playing quality or amenity use matched against the resource inputs available

Advantages and disadvantages of using efficiency ratios

Advantages: inform management decisions, objective, relative comparison of inputs

Disadvantages: influenced by the scale of the activity, may not allow direct comparisons

Maintenance practices

Mowing, edging, aeration, scarification, top dressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising, line marking

Unit 333

Understand the Principles of Sustainable Management of Turf

Notes for guidance

The learner will be able to develop the skills and knowledge involved in the sustainable management of sports and amenity turf areas. They will be able to analyse and evaluate data to make informed turf management decisions. The unit should cover as wide a range of activities as possible.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner may be aware of basic safe working practices with turf maintenance and is likely to be familiar with accepted practices and behaviours within the context in which they are working. It is not a requirement for the learner to operate machinery however health and safety issues relevant to turf maintenance must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

In Outcome 1, the learner will develop knowledge of sustainable turf management and maximising carrying capacity management. They need to develop an understanding of the inter-relationships of the soil ecosystem, the weather, material inputs and maintenance operations on specific types of turf and levels of quality. It is essential that they fully grasp these principles, as they will be applied in other outcomes and other units.

In Outcomes 2 and 3, the learner will develop skills and knowledge in assessing turf against Performance Quality Standards, using appropriate efficiency ratios and exploring how changes in inputs or maintenance operations affect the costs involved. They will need to practise these to develop the required level of skill. The learners should be able to explain the purpose, benefits and limitations of these techniques. Learners will need to be able to identify all the resource inputs, including personnel, materials, equipment, machinery and finances for a stated sport or amenity surface to maintain it to a specific level of quality

Visits to sites using these techniques, or visiting speakers from such sites will be helpful to learners.

Although this is a small unit, it will be helpful to learners to have a thorough grounding in these techniques to enable them to progress through other units more easily and to equip them for working in the industry at a supervisory or technical level.

A learner working towards level 3 is likely to have experience of maintaining sports or amenity turf. The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, site visits and research. The learner will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. Current and topical issues regarding turf management should be highlighted as and when they arise.

References

Books

Adams W.A., Gibbs R.J.1993. *Natural Turf for Sport and Amenity*. Oxford: CAB International. ISBN 0851987206.

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Websites

www.iog.org

The Institute of Groundsmanship

Unit 334

Manage Amenity Turf

Level: 3

Credit value: 10

Unit aim

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

The learner will be able to develop the skills and knowledge involved in the management of amenity turf surfaces to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards to assess the level of quality of the surface

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to manage amenity turf to Performance Quality Standards (PQS)
2. Understand the management of amenity turf surfaces to Performance Quality Standards
3. Be able to evaluate maintenance operations and their contribution to overall quality
4. Understand the determination and maintenance of the level of quality of amenity turf surfaces

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L20 Plan the maintenance of sports turf areas

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC and The Institute of Groundsmanship.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 334

Manage Amenity Turf

Outcome 1

Be able to manage amenity turf to Performance Quality Standards (PQS)

Assessment Criteria

The learner can:

1. Collect **PQS data** and assess the **level of quality** of amenity turf surfaces
2. Produce a **calendar of work for fine and coarse** amenity turf surfaces to manage them to a stated level of quality
3. Produce a **resource file** of personnel, materials, equipment, machinery and finances for amenity turf surfaces
4. Carry out **maintenance activities** on **fine and coarse** amenity turf surfaces.

Unit content

PQS data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, surface debris, and sward colour

Level of quality

Levels of Performance Quality Standards (PQS): basic (recreational use), standard (club use) and high (national and international competition use)

Calendar of work for fine and coarse

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Maintenance activities

To include mowing, aeration/scarification, divotting, top-dressing, brushing, over-seeding, top dressing, overseeding

Unit 334

Manage Amenity Turf

Outcome 2

Understand the management of amenity turf surfaces to Performance Quality Standards

Assessment Criteria

The learner can:

1. Explain why the **soil ecosystem** must be assessed before producing a calendar of work
2. Evaluate **management strategies** which can reduce the effects of wear on amenity turf surfaces
3. Explain why **weather and climate conditions** should be monitored when managing amenity turf surfaces
4. Explain how a **calendar of work** and **resource file** contribute to the management of surfaces to a stated quality

Unit content

Soil ecosystem

Soil: rootzone composition, depth, structure, bulk density, aeration, moisture status, nutrient status, organic matter status, including thatch

Vegetation: sward colour, height, density/bare patches, grass/weed species, pests, diseases and disorders

Management strategies

Inputs, choice of equipment and machines and season of use, frequencies, depth, duration, direction of travel, rotation and intensity of utilised areas, sequence of different operations, focusing on high-wear areas

Weather and climate conditions

Current season information compared with longer term averages, quantity of precipitation, quantity and quality of light, shading effects, seasonal and unseasonal frost, maximum and minimum temperatures, air movement, endemic and catastrophic climatic events

Impact upon management decisions: quality of turf surface, grasses species selection, irrigation, fertiliser application, mowing specifications, sequence of operations, pests, diseases and disorders, frequency and intensity of use

Calendar of work

Operations required during the year, the equipment/ machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Unit 334

Manage Amenity Turf

Outcome 3

Be able to evaluate maintenance operations and their contribution to overall quality

Assessment Criteria

The learner can:

1. Monitor **mowing practice and other operations** on amenity turf surfaces and evaluate how each is contributing to the quality
2. Monitor and evaluate **material inputs** and how each is contributing to the quality
3. Collect **data** and assess the overall quality of amenity turf surfaces
4. Summarise the **legislation and codes of practice** relating to the management of amenity turf surfaces

Unit content

Mowing practice and other operations

Operations: mowing, edging, aeration, scarification, topdressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising

Material inputs

Inputs: topdressing, seed, turf, water, fertiliser, labour, finance

Data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. traction, hardness

Legislation and codes of practice

Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1992 (as amended 1999), Control of Substances Hazardous to Health (2002) (COSHH), Food and Environment Protection Act 1990 (as amended 1995), Control of Pesticides Regulations 1985 (as amended 1986), Provision and Use of Work Equipment Regulations 1998

Unit 334

Manage Amenity Turf

Outcome 4

Understand the determination and maintenance of the level of quality of amenity turf surfaces

Assessment Criteria

The learner can:

1. Evaluate the **benefits** of using Performance Quality Standards (PQS) to assess the level of quality of a turf surface
2. Explain how to distinguish between **different levels of quality** for amenity turf surfaces and decide which is acceptable
3. Explain the purposes of **reviewing** materials inputs and maintenance operations
4. Explain the use of **BS7370-3** or later relevant standard in the management of amenity turf surfaces

Unit content

Benefits

Inform management decisions, determine maintenance requirement accurately, justify purchase of equipment/resources, effective use of inputs, reduced wastage, determine the carrying capacity of the turf

Different levels of quality

Levels of Performance Quality Standards: basic, standard and high

Structural: determines amenity quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, ball roll, spin, hardness

Reviewing

Obtain maximum use from the surface, maximise use of available resources, ensure operations are effective, maximise potential of turf surface, minimise waste and environmental impacts

BS7370-3

BS7370-3 provides recommendations for the management of amenity turf and outlines tests used to assess Performance Quality Standards

Unit 334 Manage Amenity Turf

Notes for guidance

The learner will be able to develop the skills and knowledge involved in the management of amenity turf surfaces to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards (PQS) to assess the level of quality of the surface. The learner should be able to select and safely use appropriate machines, equipment and materials for these tasks. The unit should cover as wide a range of activities as possible, appropriate to the areas of amenity turf available to the learner.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner may be aware of basic safe working practices with turf maintenance machinery and is likely to be familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery, therefore health and safety issues relevant to the operation of the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

All equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1 the learner will develop skills and knowledge in collection and use of Performance Quality Standards data and be able to make an initial assessment of the surface. They will be able to carry out the range of operations required on fine and coarse turf surfaces and understand the reasons for each operation. They will be able to produce a resource file and calendar of work for a high quality amenity turf surface. Access to appropriate amenity turf areas is essential to enable the learner to develop the required level of skill. For the purpose of this unit, the learner should focus on high quality fine and coarse turf, so that a wide range of operations is covered.

In Outcome 2 the learner will develop their understanding of soil, weather and climatic conditions and how these can be monitored and assessed. They will evaluate management strategies to deal with the effects of wear and explain the purpose of a calendar of work and resource file. They will require access to current sources of information. Sports Turf Research Institute (STRI) and Institute of Groundsmanship literature will be helpful. In addition, BS7370-3 which sets out the categories of amenity turf and recommendations for maintenance of amenity and functional turf (other than sports turf) would be a useful basis for study.

In Outcome 3 the learner will develop skill in monitoring operations and inputs as assessing how each is contributing to the quality. This needs to be carried out over as long a period of time as possible. The assessor may wish to set up areas of turf where different operational regimes and levels of inputs can be compared. Monitoring should take place over as long a time as possible and the learner should be encouraged to experiment with different mowing practices, frequencies, heights-of-cut, adjustment and setting up of equipment. Note should be made of the effects of sharp and blunt blades on mowers upon the quality of the turf.

In Outcome 4 the learner will evaluate the benefits of Performance Quality Standards and explain how to decide what is the acceptable level of quality for a specific surface and the purpose of reviewing inputs and operations. The learner will need to practise using Performance Quality Standards to aid understanding and will need access to current sources of information.

A learner working towards level 3 is likely to have experience of maintaining amenity turf. The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, site visits and

Unit 334 Manage Amenity Turf

research. The learner will require access to specialised literature and other resources. The delivery of this

unit may be integrated with the delivery of other units where this is feasible. Current and topical issues regarding turf management should be highlighted as and when they arise.

References

Books

Adams, W.A., Gibbs, R.J. 1993. *Natural Turf for Sport and Amenity*. Oxford: CAB International. ISBN 0851987206

Brown, S. 2005. *Sports Turf and Amenity Grassland Management*. Wiltshire: The Crowood Press. ISBN 1861267908

Sachs, P. 2004. *Managing Healthy Sports Fields*. Oxford: Wiley Publishing. ISBN 0471472697

Turgeon, A.J. 2004. *Turfgrass Management*. 7th ed. Harlow: Prentice Hall. ISBN 0131140000

BS 7370 – 3: 1991 Grounds Maintenance – Part 3: Recommendations for maintenance of amenity and functional turf (other than sports turf)

Websites

www.iog.org

The Institute of Groundsmanship

Unit 335

Manage Sports Turf Surfaces - Bowling Greens

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of management of sports turf - bowling greens - and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for bowls to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards to assess the level of quality of the surface

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to manage bowling green surfaces to Performance Quality Standards (PQS)
2. Understand the management of bowling greens to Performance Quality Standards
3. Be able to evaluate maintenance operations and their contribution to overall quality
4. Understand the determination and maintenance of the level of quality of bowling greens

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L20 Plan the maintenance of sports turf areas

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC and the Institute of Groundsmanship.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 335

Manage Sports Turf Surfaces - Bowling Greens

Outcome 1

Be able to manage bowling green surfaces to Performance Quality Standards (PQS)

Assessment Criteria

The learner can:

1. Collect **PQS data** and assess the **level of quality** of bowling greens
2. Produce a **calendar of work** for the bowling green surface to manage it to a stated level of quality
3. Produce a **resource file** of personnel, materials, equipment, machinery and finances for the bowling green
4. Carry out **maintenance activities** on the bowling green

Unit content

PQS data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, surface debris, and sward colour

Playing: e.g. ball roll, hardness, green speed

Level of quality

Levels of Performance Quality Standards: basic (recreational use), standard (club use) and high (national and international competition use)

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Maintenance activities

Assess the surface and undertake maintenance tasks (mowing, edging, aeration, scarification, top dressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising), timing, equipment (pedestrian, ride-on and tractor mounted) mode of action (powered hand held, non-powered), materials (topdressing, seed, turf) and method of application, health and safety, risk assessment, Personal Protective Equipment (PPE), environmental good practice (minimisation of impacts)

Unit 335

Manage Sports Turf Surfaces - Bowling Greens

Outcome 2

Understand the management of bowling greens to Performance Quality Standards

Assessment Criteria

The learner can:

1. Explain why the **soil ecosystem** must be assessed before producing a calendar of work
2. Evaluate **management strategies** which can reduce the effects of wear on bowling greens
3. Explain why **weather and climatic conditions** should be monitored when managing bowling greens
4. Explain how a **calendar of work** and **resource file** contribute to the management of surfaces to a stated quality

Unit content

Soil ecosystem

Soil: rootzone composition, depth, structure, bulk density, aeration, moisture status, nutrient status, organic matter status, including thatch

Vegetation: sward colour, height, density/bare patches, grass/weed species, pests, diseases and disorders

Management strategies

Inputs, choice of equipment and machines and season of use, frequencies, depth, duration, direction of travel, rotation and intensity of utilised areas, sequence of different operations, focusing on high-wear areas

Weather and climatic conditions

Current season information compared with longer term averages, quantity of precipitation, quantity and quality of light, shading effects, seasonal and unseasonal frost, maximum and minimum temperatures, air movement, localised and catastrophic climatic events

Impact upon management decisions: quality of turf surface, grasses species selection, irrigation, fertiliser application, mowing specifications, sequence of operations, pests, diseases and disorders, frequency and intensity of use

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Unit 335

Manage Sports Turf Surfaces - Bowling Greens

Outcome 3

Be able to evaluate maintenance operations and their contribution to overall quality

Assessment Criteria

The learner can:

1. Monitor **mowing practice and other operations** on bowling greens and evaluate how each is contributing to the quality
2. Monitor and evaluate **material inputs** and how each is contributing to the quality
3. Collect **data** and assess the overall quality of bowling greens
4. Summarise the **legislation and codes of practice** relating to the management of bowling greens

Unit content

Mowing practice and other operations

Operations: mowing, edging, aeration, scarification, topdressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising

Material inputs

Inputs: topdressing, seed, turf, water, fertiliser, labour, finance

Data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, surface debris, and sward colour

Playing: e.g. ball roll, hardness, green speed

Legislation and codes of practice

Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1999, Control of Substances Hazardous to Health Regulations 2002, Food and Environment Protection Act 1985, Control of Pesticides Regulations 1986, Provision and Use of Work Equipment Regulations 1998

Unit 335

Manage Sports Turf Surfaces - Bowling Greens

Outcome 4

Understand the determination and maintenance of the level of quality of bowling greens

Assessment Criteria

The learner can:

1. Evaluate the **benefits** of using Performance Quality Standards (PQS) to assess the level of quality of a turf surface
2. Explain how to distinguish between the **different levels of quality** for bowling greens and decide which is acceptable
3. Explain the purposes of **reviewing** materials inputs and maintenance operations

Unit content

Benefits

Inform management decisions, determine maintenance requirement accurately, justify purchase of equipment/resources, effective use of inputs, reduced wastage, determine the carrying capacity of the turf

Different levels of quality

Levels of Performance Quality Standards: basic, standard and high

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. ball roll, hardness, green speed

Reviewing

Obtain maximum use from the surface, maximise use of available resources, ensure operations are effective, maximise potential of turf surface, minimise waste and environmental impacts

Unit 335 Manage Sports Turf Surfaces - Bowling Greens

Notes for guidance

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for bowls to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards (PQS) to assess the level of quality of the surface. The learner should be able to select and safely use appropriate machines, equipment and materials for these tasks. The unit should cover as wide a range of activities as possible, appropriate to the bowling greens available to the learner.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner may be aware of basic safe working practices with turf maintenance machinery and is likely to be familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery therefore health and safety issues relevant to the operation of the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

All equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1 the learner will develop skills and knowledge in collection and use of PQS data and be able to make an initial assessment of the surface. They will be able to carry out the range of operations required on the surface and understand the reasons for each operation. They will be able to produce a resource file and calendar of work for the surface. Access to appropriate bowling greens is essential to enable the learner to develop the required level of skill.

In Outcome 2 the learner will develop their understanding of soil, weather and climatic conditions and how these can be monitored and assessed. They will evaluate management strategies to deal with the effects of wear and explain the purpose of a calendar of work and resource file. They will require access to current sources of information, Sports Turf Research Institute (STRI) and Institute of Groundsmanship literature will be helpful.

In Outcome 3 the learner will develop skill in monitoring operations and inputs as assessing how each is contributing to the quality. The assessor may wish to set up areas of turf where different operational regimes and levels of inputs can be compared. Monitoring should take place over as long a time as possible and the learner should be encouraged to experiment with different mowing practices, frequencies, heights-of-cut, adjustment and setting up of equipment. Note should be made of the effects of sharp and blunt blades on mowers upon the quality of the turf.

In Outcome 4 the learner will evaluate the benefits of PQS and explain how to decide what is the acceptable level of quality for a specific surface and the purpose of reviewing inputs and operations. The learner will need to practise using PQS to aid understanding and will need access to current sources of information.

A learner working towards level 3 is likely to have experience of maintaining bowling greens. The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, site visits and research. The learner will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. Current and topical issues regarding turf management should be highlighted as and when they arise.

References

Books

- Adams W.A., Gibbs R.J.1993. *Natural Turf for Sport and Amenity*. Oxford: CAB International. ISBN 0851987206.
- Brown S. 2005. *Sports Turf and Amenity Grassland Management*. Wiltshire: The Crowood Press. ISBN 1861267908.
- Brown S. 2009. *Sports Ground Management: A Complete Guide*. Wiltshire: The Crowood Press. ISBN 184797094X.
- Perris, J. 2008. *All About Bowls: The History, Construction and Maintenance of Bowling*. Yorkshire: The Sports Turf Research Institute. ISBN 1873431066
- Sachs P. 2004. *Managing Healthy Sports Fields*. Sussex: Wiley Publishing. ISBN 0471472697. Turgeon A.J. 2009. *Turfgrass Management*. 8th ed. Harlow: Pearson Education. ISBN 0131140000

Websites

www.iog.org

The Institute of Groundsmanship

Unit 336

Manage Sports Turf Surfaces - Cricket

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of management of sports turf - cricket - and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for cricket to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards to assess the level of quality of the surface

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to manage cricket surfaces to Performance Quality Standards (PQS)
2. Understand the management of cricket surfaces to Performance Quality Standards
3. Be able to evaluate maintenance operations and their contribution to overall quality
4. Understand the determination and maintenance of the level of quality of cricket surfaces

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L20 Plan the maintenance of sports turf areas

Endorsement of the unit by a sector or other appropriate body (if required, otherwise omit)

This unit is endorsed by Lantra SSC and the Institute of Groundsmanship.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 336

Manage Sports Turf Surfaces - Cricket

Outcome 1

Be able to manage cricket surfaces to Performance Quality Standards (PQS)

Assessment Criteria

The learner can:

1. Collect **PQS data** and assess the **level of quality** of cricket turf surfaces
2. Produce a **calendar of work** for each cricket surface to manage each to a stated level of quality
3. Produce a **resource file** of personnel, materials, equipment, machinery and finances for each cricket surface
4. Carry out **maintenance activities** on cricket squares, pitches and outfield

Unit content

PQS data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, ball roll, spin, hardness

Level of quality

Levels of Performance Quality Standards: basic (recreational use), standard (club use) and high (national and international competition use)

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Maintenance activities

Assess the surface and undertake maintenance tasks (mowing, edging (where a non-turf surface is used), aeration, scarification, top dressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising), timing, equipment (pedestrian, ride-on and tractor mounted) mode of action (powered hand held, non-powered), materials (topdressing, seed, turf) and method of application, marking lines, marking materials and their storage, health and safety, risk assessment, Personal Protective Equipment (PPE), environmental good practice (minimisation of impacts)

Unit 336

Manage Sports Turf Surfaces - Cricket

Outcome 2

Understand the management of cricket surfaces to Performance Quality Standards

Assessment Criteria

The learner can:

1. Explain why the **soil ecosystem** must be assessed before producing a calendar of work
2. Evaluate **management strategies** which can reduce the effects of wear on cricket surfaces
3. Explain why **weather and climatic conditions** should be monitored when managing cricket surfaces
4. Explain how a **calendar of work** and **resource file** contribute to the management of surfaces to a stated quality

Unit content

Soil ecosystem

Soil: rootzone composition, depth, structure, bulk density, aeration, moisture status, nutrient status, organic matter status, including thatch

Vegetation: sward colour, height, density/bare patches, grass/weed species, pests, diseases and disorders

Management strategies

Inputs, choice of equipment and machines and season of use, frequencies, depth, duration, direction of travel, rotation and intensity of utilised areas, sequence of different operations, focusing on high-wear areas

Weather and climatic conditions

Current season information compared with longer term averages, quantity of precipitation, quantity and quality of light, shading effects, seasonal and unseasonal frost, maximum and minimum temperatures, air movement, localised and catastrophic climatic events

Impact upon management decisions: quality of turf surface, grasses species selection, irrigation, fertiliser application, mowing specifications, sequence of operations, pests, diseases and disorders, frequency and intensity of use

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Unit 336

Manage Sports Turf Surfaces - Cricket

Outcome 3

Be able to evaluate maintenance operations and their contribution to overall quality

Assessment Criteria

The learner can:

1. Monitor **mowing practice and other operations** on cricket surfaces and evaluate how each is contributing to the quality
2. Monitor and evaluate **material inputs** and how each is contributing to the quality
3. Collect **data** and assess the overall quality of cricket surfaces
4. Summarise the **legislation and codes of practice** relating to the management of cricket surfaces

Unit content

Mowing practice and other operations

Operations: mowing, edging (where a non-turf surface is used), aeration, scarification, topdressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising, marking out

Material inputs

Inputs: topdressing, seed, turf, water, fertiliser, labour, finance

Data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, ball roll, spin, hardness

Legislation and codes of practice

Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1999, Control of Substances Hazardous to Health Regulations 2002, Food and Environment Protection Act 1985, Control of Pesticides Regulations 1986, Provision and Use of Work Equipment Regulations 1998

Unit 336

Manage Sports Turf Surfaces - Cricket

Outcome 4

Understand the determination and maintenance of the level of quality of cricket surfaces

Assessment Criteria

The learner can:

1. Evaluate the **benefits** of using Performance Quality Standards (PQS) to assess the level of quality of a turf surface
2. Explain how to distinguish between the **different levels of quality** for cricket surfaces and decide which is acceptable
3. Explain the purposes of **reviewing** material inputs and maintenance operations

Unit content

Benefits

Inform management decisions, determine maintenance requirement accurately, justify purchase of equipment/resources, effective use of inputs, reduced wastage, determine the carrying capacity of the turf

Different levels of quality

Levels of Performance Quality Standards: basic, standard and high

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, ball roll, spin, hardness

Reviewing

Obtain maximum use from the surface, maximise use of available resources, ensure operations are effective, maximise potential of turf surface, minimise waste and environmental impacts.

Unit 336 Manage Sports Turf Surfaces - Cricket

Notes for guidance

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for cricket to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards (PQS) to assess the level of quality of the surface. The learner should be able to select and safely use appropriate machines, equipment and materials for these tasks. The unit should cover as wide a range of activities as possible, appropriate to the cricket grounds available to the learner.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner may be aware of basic safe working practices with turf maintenance machinery and is likely to be familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery therefore health and safety issues relevant to the operation of the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

All equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1 the learner will develop skills and knowledge in collection and use of PQS data and be able to make an initial assessment of the surface. They will be able to carry out the range of operations required on the surface and understand the reasons for each operation. They will be able to produce a resource file and calendar of work for the surface. Access to appropriate cricket grounds is essential to enable the learner to develop the required level of skill.

In Outcome 2 the learner will develop their understanding of soil, weather and climatic conditions and how these can be monitored and assessed. They will evaluate management strategies to deal with the effects of wear and explain the purpose of a calendar of work and resource file. They will require access to current sources of information, Sports Turf Research Institute (STRI) and Institute of Groundsmanship literature will be helpful.

In Outcome 3 the learner will develop skill in monitoring operations and inputs as assessing how each is contributing to the quality. The assessor may wish to set up areas of turf where different operational regimes and levels of inputs can be compared. Monitoring should take place over as long a time as possible and the learner should be encouraged to experiment with different mowing practices, frequencies, heights-of-cut, adjustment and setting up of equipment. Note should be made of the effects of sharp and blunt blades on mowers upon the quality of the turf.

In Outcome 4 the learner will evaluate the benefits of PQS and explain how to decide what is the acceptable level of quality for a specific surface and the purpose of reviewing inputs and operations. The learner will need to practise using PQS to aid understanding and will need access to current sources of information.

A learner working towards level 3 is likely to have experience of maintaining cricket surfaces. The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, site visits and research. The learner will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. Current and topical issues regarding turf management should be highlighted as and when they arise.

References

Books

- Adams W.A., Gibbs R.J.1993. *Natural Turf for Sport and Amenity*. Oxford: CAB International. ISBN 0851987206.
- Brown S. 2005. *Sports Turf and Amenity Grassland Management*. Wiltshire: The Crowood Press. ISBN 1861267908.
- Brown S. 2009. *Sports Ground Management: A Complete Guide*. Wiltshire: The Crowood Press. ISBN 184797094X.
- Evans R.D.C. 1991. *Cricket Grounds: The Evolution, Maintenance and Construction of Natural Turf Cricket Tables and Outfields*. Yorkshire: The Sports Turf Research Institute. ISBN 1873431007.
- Sachs P. 2004. *Managing Healthy Sports Fields*. Sussex: Wiley Publishing. ISBN 0471472697.
- Turgeon A.J. 2009. *Turfgrass Management*. 8th ed. Harlow: Pearson Education. ISBN 0131140000

Websites

www.iog.org

The Institute of Groundsmanship

Unit 337

Manage Sports Turf Surfaces - Association Football

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of management of sports turf - association football - and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for association football to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards to assess the level of quality of the surface

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to manage association football pitches to Performance Quality Standards (PQS)
2. Understand the management of association football pitches to Performance Quality Standards
3. Be able to evaluate maintenance operations and their contribution to overall quality
4. Understand the determination and maintenance of the level of quality of association football pitches

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L20 Plan the maintenance of sports turf areas

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC and the Institute of Groundsmanship.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 337

Manage Sports Turf Surfaces - Association Football

Outcome 1

Be able to manage association football pitches to Performance Quality Standards (PQS)

Assessment Criteria

The learner can:

1. Collect **PQS data** and assess the **level of quality** of association football pitches
2. Produce a **calendar of work** for association football pitches to manage them to a stated level of quality
3. Produce a **resource file** of personnel, materials, equipment, machinery and finances for association football pitches
4. Carry out **maintenance activities** on association football pitches

Unit content

PQS data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, goal posts, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, ball roll, hardness

Level of quality

Levels of Performance Quality Standards: basic (recreational use), standard (club use) and high (national and international competition use)

Calendar of work

Operations required during the year, the equipment/machinery required frequencies and timing, duration, intensity, depth, direction, high wear areas, marking out, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Maintenance activities

Assess the surface and undertake maintenance tasks (mowing, edging (where a non-turf surface is used), aeration, scarification, top dressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising), timing, equipment (pedestrian, ride-on and tractor mounted) mode of action (powered hand held, non-powered), materials (topdressing, seed, turf) and method of application, marking lines, marking materials and their storage, health and safety, risk assessment, Personal Protective Equipment (PPE), environmental good practice (minimisation of impacts)

Unit 337 Outcome 2

Manage Sports Turf Surfaces - Association Football

Understand the management of association football pitches to Performance Quality Standards

Assessment Criteria

The learner can:

1. Explain why the **soil ecosystem** must be assessed before producing a calendar of work
2. Evaluate **management strategies** which can reduce the effects of wear on association football pitches
3. Explain why **weather and climatic conditions** should be monitored when managing association football pitches
4. Explain how a **calendar of work** and **resource file** contribute to the management of surfaces to a stated quality

Unit content

Soil ecosystem

Soil: rootzone composition, depth, structure, bulk density, aeration, moisture status, nutrient status, organic matter status, including thatch

Vegetation: sward colour, height, density/bare patches, grass/weed species, pests, diseases and disorders

Management strategies

Inputs, choice of equipment and machines and season of use, frequencies, depth, duration, direction of travel, rotation and intensity of utilised areas, taking the pitch in and out of play, sequence of different operations, focusing on high-wear areas

Weather and climatic conditions

Current season information compared with longer term averages, quantity of precipitation, quantity and quality of light, shading effects, seasonal and unseasonal frost, maximum and minimum temperatures, air movement, endemic and catastrophic climatic events

Impact upon management decisions: quality of turf surface, grasses species selection, irrigation, fertiliser application, mowing specifications, sequence of operations, pests, diseases and disorders, frequency and intensity of use

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, marking out, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Unit 337 **Manage Sports Turf Surfaces - Association Football**
Outcome 3 Be able to evaluate maintenance operations and their
contribution to overall quality

Assessment Criteria

The learner can:

1. Monitor **mowing practice and other operations** on association football pitches and evaluate how each is contributing to the quality
2. Monitor and evaluate **material inputs** and how each is contributing to the quality
3. Collect **data** and assess the overall quality of association football pitches
4. Summarise the **legislation and codes of practice** relating to the management of association football pitches

Unit content

Mowing practice and other operations

Operations: mowing, edging (where a non-turf surface is used), aeration, scarification, topdressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising, marking out

Material inputs

Inputs: topdressing, seed, turf, water, fertiliser, labour, finance

Data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, goal posts, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, ball roll, hardness

Legislation and codes of practice

Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1999, Control of Substances Hazardous to Health Regulations 2002, Food and Environment Protection Act 1985, Control of Pesticides Regulations 1986, Provision and Use of Work Equipment Regulations 1998

Unit 337 Outcome 4

Manage Sports Turf Surfaces - Association Football

Understand the determination and maintenance of the level of quality of association football pitches

Assessment Criteria

The learner can:

1. Evaluate the **benefits** of using Performance Quality Standards (PQS) to assess the level of quality of a turf surface
2. Explain how to distinguish between the **different levels of quality** for association football pitches and decide which is acceptable
3. Explain the purposes of **reviewing** material inputs and maintenance operations

Unit content

Benefits

Inform management decisions, determine maintenance requirement accurately, justify purchase of equipment/resources, effective use of inputs, reduced wastage, determine the carrying capacity of the turf

Different levels of quality

Levels of Performance Quality Standards: basic, standard and high

Structural: Determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, goal posts, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, ball roll, hardness

Reviewing

Obtain maximum use from the surface, maximise use of available resources, ensure operations are effective, maximise potential of turf surface, minimise waste and environmental impacts

Unit 337 Manage Sports Turf Surfaces - Association Football

Notes for guidance

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for association football to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards to assess the level of quality of the surface. The learner should be able to select and safely use appropriate machines, equipment and materials for these tasks. The unit should cover as wide a range of activities as possible, appropriate to the association football pitches available to the learner.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner may be aware of basic safe working practices with turf maintenance machinery and is likely to be familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery, therefore, health and safety issues relevant to the operation of the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

All equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1 the learner will develop skills and knowledge in collection and use of PQS data and be able to make an initial assessment of the surface. They will be able to carry out the range of operations required on the surface and understand the reasons for each operation. They will be able to produce a resource file and calendar of work for the surface. Access to appropriate association football pitches is essential to enable the learner to develop the required level of skill.

In Outcome 2 the learner will develop their understanding of soil, weather and climatic conditions and how these can be monitored and assessed. They will evaluate management strategies to deal with the effects of wear and explain the purpose of a calendar of work and resource file. They will require access to current sources of information, Sports Turf Research Institute (STRI) and Institute of Groundsmanship literature will be helpful.

In Outcome 3 the learner will develop skill in monitoring operations and inputs as assessing how each is contributing to the quality. The assessor may wish to set up areas of turf where different operational regimes and levels of inputs can be compared. Monitoring should take place over as long a time as possible and the learner should be encouraged to experiment with different mowing practices, frequencies, heights-of-cut, adjustment and setting up of equipment. Note should be made of the effects of sharp and blunt blades on mowers upon the quality of the turf.

In Outcome 4 the learner will evaluate the benefits of PQS and explain how to decide what is the acceptable level of quality for a specific surface and the purpose of reviewing inputs and operations. The learner will need to practise using PQS to aid understanding and will need access to current sources of information.

A learner working towards level 3 is likely to have experience of maintaining association football pitches. The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, site visits and research. The learner will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. Current and topical issues regarding turf management should be highlighted as and when they arise.

References

Books

- Adams W.A., Gibbs R.J.1993. *Natural Turf for Sport and Amenity*. Oxford: CAB International. ISBN 0851987206.
- Brown S. 2005. *Sports Turf and Amenity Grassland Management*. Wiltshire: The Crowood Press. ISBN 1861267908.
- Brown S. 2009. *Sports Ground Management: A Complete Guide*. Wiltshire: The Crowood Press. ISBN 184797094X.
- Evans R.D.C. 1994. *Winter Games Pitches: The Construction and Maintenance of Natural Turf Pitches*. Yorkshire: The Sports Turf Research Institute. ISBN 1873431031.
- Sachs P. 2004. *Managing Healthy Sports Fields*. Sussex: Wiley Publishing. ISBN 0471472697.
- Turgeon A.J. 2009. *Turfgrass Management*. 8th ed. Harlow: Pearson Education. ISBN 0131140000

Websites

www.iog.org

The Institute of Groundsmanship

Unit 338

Manage Sports Turf Surfaces - Golf

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of management of sports turf - golf - and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for golf to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards to assess the level of quality of the surface

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to manage golf surfaces to Performance Quality Standards (PQS)
2. Understand the management of golf surfaces to Performance Quality Standards
3. Be able to evaluate maintenance operations and their contribution to overall quality
4. Understand the determination and maintenance of the level of quality of golf surfaces

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L20 Plan the maintenance of sports turf areas

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC and the Institute of Groundsmanship.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 338

Manage Sports Turf Surfaces - Golf

Outcome 1

Be able to manage golf surfaces to Performance Quality Standards (PQS)

Assessment Criteria

The learner can:

1. Collect **PQS data** and assess the **level of quality** of golf turf surfaces
2. Produce a **calendar of work** for each golf surface to manage each to a stated level of quality
3. Produce a **resource file** of personnel, materials, equipment, machinery and finances for each golf surface
4. Carry out **maintenance activities** on golf greens, tees and fairways

Unit content

PQS data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, soil PH, infiltration rate

Presentational: e.g. appearance, surface debris, and sward colour

Playing: e.g. ball roll, hardness, green speed

Level of quality

Levels of Performance Quality Standards: basic (recreational use), standard (club use) and high (national and international competition use)

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, markers and flags, winter tees, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Maintenance activities

Assess the surface and undertake maintenance tasks (mowing, edging (where a non-turf surface is used), aeration, scarification, top dressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising), timing, equipment (pedestrian, ride-on and tractor mounted) mode of action (powered hand held, non-powered), materials (topdressing, seed, turf) and method of application, markers and flags, health and safety, risk assessment, Personal Protective Equipment (PPE), environmental good practice (minimisation of impacts)

Unit 338

Manage Sports Turf Surfaces - Golf

Outcome 2

Understand the management of golf surfaces to Performance Quality Standards

Assessment Criteria

The learner can:

1. Explain why the **soil ecosystem** must be assessed before producing a calendar of work
2. Evaluate **management strategies** which can reduce the effects of wear on golf surfaces
3. Explain why **weather and climate conditions** should be monitored when managing golf surfaces
4. Explain how a **calendar of work and resource file** contribute to the management of surfaces to a stated quality.

Unit content

Soil ecosystem

Soil: rootzone composition, depth, structure, bulk density, aeration, moisture status, nutrient status, organic matter status, including thatch

Vegetation: sward colour, height, density/bare patches, grass/weed species, pests, diseases and disorders

Management strategies

Inputs, choice of equipment and machines and season of use, frequencies, depth, duration, direction of travel, rotation and intensity of utilised areas, sequence of different operations, using winter tees, focusing on high-wear areas

Weather and climate conditions

Current season information compared with longer term averages, quantity of precipitation, quantity and quality of light, shading effects, seasonal and unseasonal frost, maximum and minimum temperatures, air movement, endemic and catastrophic climatic events

Impact upon management decisions: quality of turf surface, grasses species selection, irrigation, fertiliser application, mowing specifications, sequence of operations, pests, diseases and disorders, frequency and intensity of use

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, markers and flags, winter tees, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Unit 338

Manage Sports Turf Surfaces - Golf

Outcome 3

Be able to evaluate maintenance operations and their contribution to overall quality

Assessment Criteria

The learner can:

1. Monitor **mowing practice and other operations** on golf surfaces and evaluate how each is contributing to the quality
2. Monitor and evaluate **material inputs** and how each is contributing to the quality
3. Collect **data** and assess the overall quality of golf surfaces
4. Summarise the **legislation and codes of practice** relating to the management of golf surfaces

Unit content

Mowing practice and other operations

Operations: mowing, verti-cutting, aeration, scarification, topdressing, rolling, turfing, grooming, seeding, irrigation, brushing/switching, fertilising, marking out

Material inputs

Inputs: topdressing, seed, turf, water, fertiliser, labour, finance

Data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, soil PH, infiltration rate

Presentational: e.g. appearance, surface debris, and sward colour

Playing: e.g. ball roll, hardness, green speed

Legislation and codes of practice

Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1999, Control of Substances Hazardous to Health Regulations 2002, Food and Environment Protection Act 1985, Control of Pesticides Regulations 1986, Provision and Use of Work Equipment Regulations 1998

Unit 338

Manage Sports Turf Surfaces - Golf

Outcome 4

Understand the determination and maintenance of the level of quality of golf surfaces

Assessment Criteria

The learner can:

1. Evaluate the **benefits** of using Performance Quality Standards (PQS) to assess the level of quality of a turf surface
2. Explain how to distinguish between **different levels of quality** for golf surfaces and decide which is acceptable
3. Explain the purposes of **reviewing** materials inputs and maintenance operations.

Unit content

Benefits

Inform management decisions, determine maintenance requirement accurately, justify purchase of equipment/ resources, effective use of inputs, reduced wastage, determine the carrying capacity of the turf

Different levels of quality

Levels of Performance Quality Standards: basic, standard and high

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, soil PH, infiltration rate

Presentational: e.g. appearance, surface debris, and sward colour

Playing: e.g. vertical ball bounce, ball roll, traction, hardness

Reviewing

Obtain maximum use from the surface, maximise use of available resources, ensure operations are effective, maximise potential of turf surface, minimise waste and environmental impacts

Unit 338 Manage Sports Turf Surfaces - Golf

Notes for guidance

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for golf to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards to assess the level of quality of the surface. The learner should be able to select and safely use appropriate machines, equipment and materials for these tasks. The unit should cover as wide a range of activities as possible, appropriate to the golf courses available to the learner.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner may be aware of basic safe working practices with turf maintenance machinery and is likely to be familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery, therefore, health and safety issues relevant to the operation of the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

All equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1, the learner will develop skills and knowledge in collection and use of PQS data and be able to make an initial assessment of the surface. They will be able to carry out the range of operations required on the surface and understand the reasons for each operation. They will be able to produce a resource file and calendar of work for the surface. Access to appropriate golf courses is essential to enable the learner to develop the required level of skill.

In Outcome 2, the learner will develop their understanding of soil, weather and climatic conditions and how these can be monitored and assessed. They will evaluate management strategies to deal with the effects of wear and explain the purpose of a calendar of work and resource file. They will require access to current sources of information. Sports Turf Research Institute (STRI) and Institute of Groundsmanship literature will be helpful.

In Outcome 3, the learner will develop skill in monitoring operations and inputs as assessing how each is contributing to the quality. The assessor may wish to set up areas of turf where different operational regimes and levels of inputs can be compared. Monitoring should take place over as long a time as possible and the learner should be encouraged to experiment with different mowing practices, frequencies, heights-of-cut, adjustment and setting up of equipment. Note should be made of the effects of sharp and blunt blades on mowers upon the quality of the turf.

In Outcome 4, the learner will evaluate the benefits of PQS and explain how to decide what is the acceptable level of quality for a specific surface and the purpose of reviewing inputs and operations. The learner will need to practise using PQS to aid understanding and will need access to current sources of information.

A learner working towards level 3 is likely to have experience of maintaining golf surfaces. The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, site visits and research. The learner will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. Current and topical issues regarding turf management should be highlighted as and when they arise.

References

Books

- Adams W.A., Gibbs R.J.1993. *Natural Turf for Sport and Amenity*. Oxford: CAB International. ISBN 0851987206.
- Arthur, J. 1997. *Practical Greenkeeping*. Scotland: Royal & Ancient Golf Club of St Andrews. ISBN 0907583121.
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- Evans R.D.C. 1994. *Winter Games Pitches: The Construction and Maintenance of Natural Turf Pitches*. Yorkshire: The Sports Turf Research Institute. ISBN 1873431031.
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- Turgeon A.J. 2009. *Turfgrass Management*. 8th ed. Harlow: Pearson Education. ISBN 0131140000
- Witteveen. G., Bavier, M. 2004. *Practical Golf Course Maintenance: The Magic of Greenkeeping*. Sussex: Wiley Publishing. ISBN 0471475823.

Websites

www.iog.org

The Institute of Groundsmanship

Unit 339

Manage Sports Turf Surfaces - Horseracing

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of management of sports turf - horseracing - and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for horseracing to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards to assess the level of quality of the surface

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to manage horseracing surfaces to Performance Quality Standards (PQS)
2. Understand the management of horseracing surfaces to Performance Quality Standards
3. Be able to evaluate maintenance operations and their contribution to overall quality
4. Understand the determination and maintenance of the level of quality of horseracing surfaces

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L20 Plan the maintenance of sports turf areas

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC and the Institute of Groundsmanship.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 339

Manage Sports Turf Surfaces - Horseracing

Outcome 1

Be able to manage horseracing surfaces to Performance Quality Standards (PQS)

Assessment Criteria

The learner can:

1. Collect **PQS data** and assess the **level of quality** of horseracing surfaces
2. Produce a **calendar of work** for horseracing surfaces to manage them to a stated level of quality
3. Produce a **resource file** of personnel, materials, equipment, machinery and finances for horseracing surfaces
4. Carry out **maintenance activities** on horseracing surfaces

Unit content

PQS data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, surface debris, and sward colour

Racing: e.g. traction, hardness ('the going')

Level of quality

Levels of Performance Quality Standards: basic (recreational use), standard (club use) and high (national and international competition use)

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, markers and fencing, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Maintenance activities

Assess the surface and undertake maintenance tasks (mowing, edging, aeration, scarification, top dressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising), timing, equipment (pedestrian, ride-on and tractor mounted) mode of action (powered hand held, non-powered), materials (topdressing, seed, turf) and method of application, re-positioning of running rails, fencing set out and prepared for the start of the event, health and safety, risk assessment, Personal Protective Equipment (PPE), environmental good practice (minimisation of impacts)

Unit 339

Manage Sports Turf Surfaces - Horseracing

Outcome 2

Understand the management of horseracing surfaces to Performance Quality Standards

Assessment Criteria

The learner can:

5. Explain why the **soil ecosystem** must be assessed before producing a calendar of work
6. Evaluate **management strategies** which can reduce the effects of wear on horseracing surfaces
7. Explain why **weather and climate conditions** should be monitored when managing horseracing surfaces
8. Explain how a **calendar of work and resource file** contribute to the management of surfaces to a stated quality

Unit content

Soil ecosystem

Soil: rootzone composition, depth, structure, bulk density, aeration, moisture status, nutrient status, organic matter status, including thatch

Vegetation: sward colour, height, density/bare patches, grass/weed species, pests, diseases and disorders

Weather and climatic conditions

Current season information compared with longer term averages, quantity of precipitation, quantity and quality of light, shading effects, seasonal and unseasonal frost, maximum and minimum temperatures, air movement, endemic and catastrophic climatic events

Impact upon management decisions quality of turf surface, grasses species selection, irrigation, fertiliser application, mowing specifications, sequence of operations, pests, diseases and disorders, frequency and intensity of use

Management strategies

Inputs, choice of equipment and machines and season of use, frequencies, depth, duration, direction of travel, rotation and intensity of utilised areas, sequence of different operations, focusing on high-wear areas

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, markers and fencing, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Unit 339

Manage Sports Turf Surfaces - Horseracing

Outcome 3

Be able to evaluate maintenance operations and their contribution to overall quality

Assessment Criteria

The learner can:

1. Monitor **mowing practice and other operations** on horseracing surfaces and evaluate how each is contributing to the quality
2. Monitor and evaluate **material inputs** and how each is contributing to the quality
3. Collect **data** and assess the overall quality of horseracing surfaces
4. Summarise the **legislation and codes of practice** relating to the management of horseracing surfaces

Unit content

Mowing practice and other operations

Operations: mowing, edging, aeration, scarification, topdressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising, fencing

Material inputs

Inputs: topdressing, seed, turf, water, fertiliser, labour, finance

Data

Levels of Performance Quality Standards: basic, standard and high

Structural: determines racing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, surface debris, and sward colour

Racing: e.g. traction, hardness, ('the going')

Legislation and codes of practice

Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1999, Control of Substances Hazardous to Health Regulations 2002, Food and Environment Protection Act 1985, Control of Pesticides Regulations 1986, Provision and Use of Work Equipment Regulations 1998

Unit 339

Manage Sports Turf Surfaces - Horseracing

Outcome 4

Understand the determination and maintenance of the level of quality of horseracing surfaces

Assessment Criteria

The learner can:

1. Evaluate the **benefits** of using Performance Quality Standards (PQS) to assess the level of quality of a turf surface
2. Explain how to distinguish between the **different levels of quality** for horseracing surfaces and decide which is acceptable
3. Explain the purposes of **reviewing** materials inputs and maintenance operations

Unit content

Benefits

Inform management decisions, determine maintenance requirement accurately, justify purchase of equipment/resources, effective use of inputs, reduced wastage, determine the carrying capacity of the turf

Different levels of quality

Levels of Performance Quality Standards: basic, standard and high

Structural: determines racing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, surface debris, and sward colour

Racing: e.g. traction, hardness, ('the going')

Reviewing

Obtain maximum use from the surface, maximise use of available resources, ensure operations are effective, maximise potential of turf surface, minimise waste and environmental impacts

Unit 339 Manage Sports Turf Surfaces - Horseracing

Notes for guidance

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for horseracing to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards (PQS) to assess the level of quality of the surface. The learner should be able to select and safely use appropriate machines, equipment and materials for these tasks. The unit should cover as wide a range of activities as possible, appropriate to the horseracing sites available to the learner.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner may be aware of basic safe working practices with turf maintenance machinery and is likely to be familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery therefore, health and safety issues relevant to the operation of the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

All equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1 the learner will develop skills and knowledge in collection and use of PQS data and be able to make an initial assessment of the surface. They will be able to carry out the range of operations required on the surface and understand the reasons for each operation. They will be able to produce a resource file and calendar of work for the surface. Access to appropriate horseracing sites is essential to enable the learner to develop the required level of skill. Tasks should relate to Flat and National Hunt racing.

In Outcome 2 the learner will develop their understanding of soil, weather and climatic conditions and how these can be monitored and assessed. They will evaluate management strategies to deal with the effects of wear and explain the purpose of a calendar of work and resource file. They will require access to current sources of information, Sports Turf Research Institute (STRI) and Institute of Groundsmanship literature will be helpful.

In Outcome 3 the learner will develop skill in monitoring operations and inputs as assessing how each is contributing to the quality. The assessor may wish to set up areas of turf where different operational regimes and levels of inputs can be compared. Monitoring should take place over as long a time as possible and the learner should be encouraged to experiment with different mowing practices, frequencies, heights-of-cut, adjustment and setting up of equipment. Note should be made of the effects of sharp and blunt blades on mowers upon the quality of the turf.

In Outcome 4 the learner will evaluate the benefits of PQS and explain how to decide what is the acceptable level of quality for a specific surface and the purpose of reviewing inputs and operations. The learner will need to practise using PQS to aid understanding and will need access to current sources of information.

A learner working towards level 3 is likely to have experience of maintaining horseracing surfaces. The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, site visits and research. The learner will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. Current and topical issues regarding turf management should be highlighted as and when they arise.

References

Books

Adams W.A., Gibbs R.J.1993. *Natural Turf for Sport and Amenity*. Oxford: CAB International. ISBN 0851987206.

Brown S. 2005. *Sports Turf and Amenity Grassland Management*. Wiltshire: The Crowood Press. ISBN 1861267908.

Websites

www.iog.org

The Institute of Groundsmanship

Unit 340

Manage Sports Turf Surfaces - Rugby Pitches

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of management of sports turf - rugby - pitches and how these can be put into practice. This unit is primarily aimed at learners within a centre- based setting looking to progress into the sector or to further education and training.

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for rugby to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards to assess the level of quality of the surface

Learning outcomes

There are four learning outcomes to this unit. The learner will:

1. Be able to manage rugby pitches to Performance Quality Standards (PQS)
2. Understand the management of rugby pitches to Performance Quality Standards
3. Be able to evaluate maintenance operations and their contribution to overall quality
4. Understand the determination and maintenance of the level of quality of rugby Pitches

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L20 Plan the maintenance of sports turf areas

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC and the Institute of Groundsmanship.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 340

Manage Sports Turf Surfaces - Rugby Pitches

Outcome 1

Be able to manage rugby pitches to Performance Quality Standards (PQS)

Assessment Criteria

The learner can:

1. Collect **PQS data** and assess the **level of quality** of rugby pitches
2. Produce a **calendar of work** for rugby pitches to manage them to a stated level of quality
3. Produce a **resource file** of personnel, materials, equipment, machinery and finances for rugby pitches
4. Carry out **maintenance activities** on rugby pitches

Unit content

PQS data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, hardness

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Level of quality

Levels of Performance Quality Standards: basic (recreational use), standard (club use) and high (national and international competition use)

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Maintenance activities

Assess the surface and undertake maintenance tasks (mowing, edging (where a non-turf surface is used), aeration, scarification, top dressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising), timing, equipment (pedestrian, ride-on and tractor mounted) mode of action (powered hand held, non-powered), materials (topdressing, seed, turf) and method of application, marking lines and marking materials, health and safety, risk assessment, Personal Protective Equipment (PPE), environmental good practice (minimisation of impacts)

Unit 340

Manage Sports Turf Surfaces - Rugby Pitches

Outcome 2

Understand the management of rugby pitches to Performance Quality Standards

Assessment Criteria

The learner can:

1. Explain why the **soil ecosystem** must be assessed before producing a calendar of work
2. Evaluate **management strategies** which can reduce the effects of wear on rugby pitches
3. Explain why **weather and climatic conditions** should be monitored when managing rugby pitches
4. Explain how a **calendar of work and resource file** contribute to the management of surfaces to a stated quality

Unit content

Soil ecosystem

Soil: rootzone composition, depth, structure, bulk density, aeration, moisture status, nutrient status, organic matter status, including thatch

Vegetation: sward colour, height, density/bare patches, grass/weed species, pests, diseases and disorders

Weather and climatic conditions

Current season information compared with longer term averages, quantity of precipitation, quantity and quality of light, shading effects, seasonal and unseasonal frost, maximum and minimum temperatures, air movement, endemic and catastrophic climatic events

Impact upon management decisions, quality of turf surface, grasses species selection, irrigation, fertiliser application, mowing specifications, sequence of operations, pests, diseases and disorders, frequency and intensity of use

Management strategies

Inputs, choice of equipment and machines and season of use, frequencies, depth, duration, direction of travel, rotation and intensity of utilised areas, sequence of different operations, focusing on high-wear areas

Calendar of work

Operations required during the year, the equipment/ machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Unit 340

Manage Sports Turf Surfaces - Rugby Pitches

Outcome 3

Be able to evaluate maintenance operations and their contribution to overall quality

Assessment Criteria

The learner can:

1. Monitor **mowing practice and other operations** on rugby pitches and evaluate how each is contributing to the quality
2. Monitor and evaluate **material inputs** and how each is contributing to the quality
3. Collect **data** and assess the overall quality of rugby pitches
4. Summarise the **legislation and codes of practice** relating to the management of rugby pitches

Unit content

Mowing practice and other operations

Operations: mowing, edging (where a non-turf surface is used), aeration, scarification, topdressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising, marking out

Material inputs

Inputs: topdressing, seed, turf, water, fertiliser, labour, finance

Data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, hardness

Legislation and codes of practice

Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1999, Control of Substances Hazardous to Health Regulations 2002, Food and Environment Protection Act 1985, Control of Pesticides Regulations 1986, Provision and Use of Work Equipment Regulations 1998

Unit 340

Manage Sports Turf Surfaces - Rugby Pitches

Outcome 4

Understand the determination and maintenance of the level of quality of rugby Pitches

Assessment Criteria

The learner can:

1. Evaluate the **benefits** of using Performance Quality Standards (PQS) to assess the level of quality of a turf surface
2. Explain how to distinguish between the **different levels of quality** for rugby pitches and decide which is acceptable
3. Explain the purposes of **reviewing** material inputs and maintenance operations

Unit content

Benefits

Inform management decisions, determine maintenance requirement accurately, justify purchase of equipment/resources, effective use of inputs, reduced wastage, determine the carrying capacity of the turf

Different levels of quality

Levels of Performance Quality Standards: basic, standard and high

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, hardness

Reviewing

Obtain maximum use from the surface, maximise use of available resources, ensure operations are effective, maximise potential of turf surface, minimise waste and environmental impacts

Unit 340 Manage Sports Turf Surfaces - Rugby Pitches

Notes for guidance

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for rugby to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards (PQS) to assess the level of quality of the surface. The learner should be able to select and safely use appropriate machines, equipment and materials for these tasks. The unit should cover as wide a range of activities as possible, appropriate to the rugby pitches available to the learner.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner may be aware of basic safe working practices with turf maintenance machinery and is likely to be familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery therefore health and safety issues relevant to the operation of the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

All equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1, the learner will develop skills and knowledge in collection and use of PQS data and be able to make an initial assessment of the surface. They will be able to carry out the range of operations required on the surface and understand the reasons for each operation. They will be able to produce a resource file and calendar of work for the surface. Access to appropriate rugby pitches is essential to enable the learner to develop the required level of skill. Tasks should relate to Rugby League and Rugby Union.

In Outcome 2, the learner will develop their understanding of soil, weather and climatic conditions and how these can be monitored and assessed. They will evaluate management strategies to deal with the effects of wear and explain the purpose of a calendar of work and resource file. They will require access to current sources of information, Sports Turf Research Institute (STRI) and Institute of Groundsmanship literature will be helpful.

In Outcome 3, the learner will develop skill in monitoring operations and inputs as assessing how each is contributing to the quality. The assessor may wish to set up areas of turf where different operational regimes and levels of inputs can be compared. Monitoring should take place over as long a time as possible and the learner should be encouraged to experiment with different mowing practices, frequencies, heights-of-cut, adjustment and setting up of equipment. Note should be made of the effects of sharp and blunt blades on mowers upon the quality of the turf.

In Outcome 4, the learner will evaluate the benefits of PQS and explain how to decide what is the acceptable level of quality for a specific surface and the purpose of reviewing inputs and operations. The learner will need to practise using PQS to aid understanding and will need access to current sources of information.

A learner working towards level 3 is likely to have experience of maintaining rugby pitches. The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, site visits and research. The learner will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. Current and topical issues regarding turf management should be highlighted as and when they arise.

References

Books

- Adams W.A., Gibbs R.J.1993. *Natural Turf for Sport and Amenity*. Oxford: CAB International. ISBN 0851987206.
- Brown S. 2005. *Sports Turf and Amenity Grassland Management*. Wiltshire: The Crowood Press. ISBN 1861267908.
- Brown S. 2009. *Sports Ground Management: A Complete Guide*. Wiltshire: The Crowood Press. ISBN 184797094X.
- Evans R.D.C. 1994. *Winter Games Pitches: The Construction and Maintenance of Natural Turf Pitches*. Yorkshire: The Sports Turf Research Institute. ISBN 1873431031.
- Sachs P. 2004. *Managing Healthy Sports Fields*. Sussex: Wiley Publishing. ISBN 0471472697.
- Turgeon A.J. 2009. *Turfgrass Management*. 8th ed. Harlow: Pearson Education. ISBN 0131140000

Websites

www.iog.org

The Institute of Groundsmanship

Unit 341

Manage Sports Turf Surfaces - Tennis

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of management of sports turf - tennis - and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for tennis to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards to assess the level of quality of the surface

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to manage tennis courts to Performance Quality Standards (PQS)
2. Understand the management of tennis courts to Performance Quality Standards
3. Be able to evaluate maintenance operations and their contribution to overall quality
4. Understand the determination and maintenance of the level of quality of tennis courts

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L20 Plan the maintenance of sports turf areas

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC and the Institute of Groundsmanship.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 341

Manage Sports Turf Surfaces - Tennis

Outcome 1

Be able to manage tennis courts to Performance Quality Standards (PQS)

Assessment Criteria

The learner can:

1. Collect **PQS data** and assess the **level of quality** of tennis courts
2. Produce a **calendar of work** for tennis courts to manage them to a stated level of quality
3. Produce a **resource file** of personnel, materials, equipment, machinery and finances for tennis courts
4. Carry out **maintenance activities** on tennis courts

Unit content

PQS data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, hardness

Level of quality

Levels of Performance Quality Standards: basic (recreational use), standard (club use) and high (national and international competition use)

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Maintenance activities

Assess the surface and undertake maintenance tasks (mowing, edging (where a non-turf surface is used), aeration, scarification, top dressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising), timing, equipment (pedestrian, ride-on and tractor mounted) mode of action (powered hand held, non-powered), materials (topdressing, seed, turf) and method of application, marking lines and marking materials, health and safety, risk assessment, Personal Protective Equipment (PPE), environmental good practice (minimisation of impacts)

Unit 341

Manage Sports Turf Surfaces - Tennis

Outcome 2

Understand the management of tennis courts to Performance Quality Standards

Assessment Criteria

The learner can:

1. Explain why the **soil ecosystem** must be assessed before producing a calendar of work
2. Evaluate **management strategies** which can reduce the effects of wear on tennis courts
3. Explain why **weather and climatic conditions** should be monitored when managing tennis courts
4. Explain how a **calendar of work and resource file** contribute to the management of surfaces to a stated quality

Unit content

Soil ecosystem

Soil: rootzone composition, depth, structure, bulk density, aeration, moisture status, nutrient status, organic matter status, including thatch

Vegetation: sward colour, height, density/bare patches, grass/weed species, pests, diseases and disorders

Weather and climatic conditions

Current season information compared with longer term averages, quantity of precipitation, quantity and quality of light, shading effects, seasonal and unseasonal frost, maximum and minimum temperatures, air movement, endemic and catastrophic climatic events

Impact upon management decisions, quality of turf surface, grasses species selection, irrigation, fertiliser application, mowing specifications, sequence of operations, pests, diseases and disorders, frequency and intensity of use

Management strategies

Inputs, choice of equipment and machines and season of use, frequencies, depth, duration, direction of travel, rotation and intensity of utilised areas, sequence of different operations, taking the courts in and out of play, focusing on high-wear areas

Calendar of work

Operations required during the year, the equipment/machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Unit 341

Manage Sports Turf Surfaces - Tennis

Outcome 3

Be able to evaluate maintenance operations and their contribution to overall quality

Assessment Criteria

The learner can:

1. Monitor **mowing practice and other operations** on tennis courts and evaluate how each is contributing to the quality
2. Monitor and evaluate **material inputs** and how each is contributing to the quality
3. Collect **data** and assess the overall quality of tennis courts
4. Summarise the **legislation and codes of practice** relating to the management of tennis courts

Unit content

Mowing practice and other operations

Operations: mowing, edging (where a non-turf surface is used), aeration, scarification, topdressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising, marking out

Material inputs

Inputs: topdressing, seed, turf, water, fertiliser, labour, finance

Data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, hardness

Legislation and codes of practice

Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1999, Control of Substances Hazardous to Health Regulations 2002, Food and Environment Protection Act 1985, Control of Pesticides Regulations 1986, Provision and Use of Work Equipment Regulations 1998

Unit 341

Manage Sports Turf Surfaces - Tennis

Outcome 4

Understand the determination and maintenance of the level of quality of tennis courts

Assessment Criteria

The learner can:

1. Evaluate the **benefits** of using Performance Quality Standards (PQS) to assess the level of quality of a turf surface
2. Explain how to distinguish between **different levels of quality** for tennis courts and decide which is acceptable
3. Explain the purposes of **reviewing** material inputs and maintenance operations

Unit content

Benefits

Inform management decisions, determine maintenance requirement accurately, justify purchase of equipment/ resources, effective use of inputs, reduced wastage, determine the carrying capacity of the turf

Different levels of quality

Levels of Performance Quality Standards: basic, standard and high

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, hardness

Reviewing

Obtain maximum use from the surface, maximise use of available resources, ensure operations are effective, maximise potential of turf surface, minimise waste and environmental impacts

Unit 341 Manage Sports Turf Surfaces - Tennis

Notes for guidance

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for tennis to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards (PQS) to assess the level of quality of the surface. The learner should be able to select and safely use appropriate machines, equipment and materials for these tasks. The unit should cover as wide a range of activities as possible, appropriate to the tennis courts available to the learner.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner may be aware of basic safe working practices with turf maintenance machinery and is likely to be familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery therefore health and safety issues relevant to the operation of the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

All equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1, the learner will develop skills and knowledge in collection and use of PQS data and be able to make an initial assessment of the surface. They will be able to carry out the range of operations required on the surface and understand the reasons for each operation. They will be able to produce a resource file and calendar of work for the surface. Access to appropriate tennis courts is essential to enable the learner to develop the required level of skill.

In Outcome 2, the learner will develop their understanding of soil, weather and climatic conditions and how these can be monitored and assessed. They will evaluate management strategies to deal with the effects of wear and explain the purpose of a calendar of work and resource file. They will require access to current sources of information, Sports Turf Research Institute (STRI) and Institute of Groundsmanship literature will be helpful.

In Outcome 3, the learner will develop skill in monitoring operations and inputs as assessing how each is contributing to the quality. The assessor may wish to set up areas of turf where different operational regimes and levels of inputs can be compared. Monitoring should take place over as long a time as possible and the learner should be encouraged to experiment with different mowing practices, frequencies, heights-of-cut, adjustment and setting up of equipment. Note should be made of the effects of sharp and blunt blades on mowers upon the quality of the turf.

In Outcome 4, the learner will evaluate the benefits of PQS and explain how to decide what is the acceptable level of quality for a specific surface and the purpose of reviewing inputs and operations. The learner will need to practise using PQS to aid understanding and will need access to current sources of information.

A learner working towards level 3 is likely to have experience of maintaining tennis surfaces. The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, site visits and research. The learner will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. Current and topical issues regarding turf management should be highlighted as and when they arise.

References

Books

- Adams W.A., Gibbs R.J.1993. *Natural Turf for Sport and Amenity*. Oxford: CAB International. ISBN 0851987206.
- Brown S. 2005. *Sports Turf and Amenity Grassland Management*. Wiltshire: The Crowood Press. ISBN 1861267908.
- Brown S. 2009. *Sports Ground Management: A Complete Guide*. Wiltshire: The Crowood Press. ISBN 184797094X.
- Perris, J. 2000. *Grass Tennis Courts: How to construct and maintain them*. Yorkshire: The Sports Turf Research Institute. ISBN 1873431341
- Sachs P. 2004. *Managing Healthy Sports Fields*. Sussex: Wiley Publishing. ISBN 0471472697. Turgeon A.J. 2009. *Turfgrass Management*. 8th ed. Harlow: Pearson Education. ISBN 0131140000

Websites

www.iog.org

The Institute of Groundsmanship

Unit 342

Manage Winter and Summer Sports Turf

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of the principles of management of winter and summer sports turf and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for winter and summer sports to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards to assess the level of quality of the surface

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Be able to manage winter and summer sports turf surfaces to Performance Quality Standards (PQS)
2. Understand the management of winter and summer sports turf surfaces to Performance Quality Standards
3. Be able to evaluate maintenance operations and their contribution to overall quality
4. Understand the determination and maintenance of the level of quality of sports turf surfaces

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

L20 Plan the maintenance of sports turf areas

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 342

Manage Winter and Summer Sports Turf

Outcome 1

Be able to manage winter and summer sports turf surfaces to Performance Quality Standards (PQS)

Assessment Criteria

The learner can:

1. Collect **PQS data** and assess the **level of quality** of a sports turf surface
2. Produce a **calendar of work** for a sports turf surface to manage it to a stated level of quality
3. Produce a **resource file** of personnel, materials, equipment, machinery and finances for a sports turf surface
4. Carry out **maintenance activities** on winter and summer sports turf surfaces

Unit content

PQS data

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, ball roll, spin, hardness

Level of quality

Levels of Performance Quality Standards: basic (recreational use), standard (club use) and high (national and international competition use)

Calendar of work

Operations required during the year, the equipment/ machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Maintenance activities

Assess the surface and undertake maintenance tasks (mowing, edging, aeration, scarification, top dressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising), timing, equipment (pedestrian, ride-on and tractor mounted) mode of action (powered hand held, non-powered), materials (topdressing, seed, turf) and method of application, marking and marking materials, health and safety, risk assessment, Personal Protective Equipment (PPE), environmental good practice (minimisation of impacts)

Unit 342

Manage Winter and Summer Sports Turf

Outcome 2

Understand the management of winter and summer sports turf surfaces to Performance Quality Standards

Assessment Criteria

The learner can:

1. Explain why the **soil ecosystem** must be assessed before producing a calendar of work
2. Evaluate **management strategies** which can reduce the effects of wear on specific sports turf surfaces
3. Explain why **weather and climatic conditions** should be monitored when managing sports turf surfaces
4. Explain how a **calendar of work and resource file** contribute to the management of surfaces to a stated quality

Unit content

Soil ecosystem

Soil: rootzone composition, depth, structure, bulk density, aeration, moisture status, nutrient status, organic matter status, including thatch

Vegetation: sward colour, height, density/bare patches, grass/weed species, pests, diseases and disorders

Management strategies

Inputs, choice of equipment and machines and season of use, frequencies, depth, duration, direction of travel, rotation and intensity of utilised areas, sequence of different operations, focusing on high-wear areas

Weather and climatic conditions

Current season information compared with longer term averages, quantity of precipitation, quantity and quality of light, shading effects, seasonal and unseasonal frost, maximum and minimum temperatures, air movement, endemic and catastrophic climatic events

Impact upon management decisions, quality of turf surface, grasses species selection, irrigation, fertiliser application, mowing specifications, sequence of operations, pests, diseases and disorders, frequency and intensity of use

Calendar of work

Operations required during the year, the equipment/ machinery required, frequencies and timing, duration, intensity, depth, direction, high wear areas, pest, disease and disorder management strategy

Resource file

Management file to include details of all resources, including personnel, materials, equipment, machinery and finances

Unit 342

Manage Winter and Summer Sports Turf

Outcome 3

Be able to evaluate maintenance operations and their contribution to overall quality

Assessment Criteria

The learner can:

1. Monitor **mowing practice and other operations** on a specific sports turf surface and evaluate how each is contributing to the quality
2. Monitor and evaluate **material inputs** how each is contributing to the quality of a specific sports turf surface
3. Collect **data** and assess the overall quality of sports turf surfaces
4. Summarise the **legislation and codes of practice** relating to the management of sports turf surfaces

Unit content

Mowing practice and other operations

Operations: mowing, edging, aeration, scarification, topdressing, rolling, turfing, seeding, irrigation, brushing/switching, fertilising, marking out

Material inputs

Inputs: topdressing, seed, turf, water, fertiliser, labour, finance

Data

Levels of Performance Quality Standards: basic, standard and high

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, ball roll, spin, hardness

Legislation and codes of practice

Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1999, Control of Substances Hazardous to Health Regulations 2002, Food and Environment Protection Act 1985, Control of Pesticides Regulations 1986, Provision and Use of Work Equipment Regulations 1998

Unit 342

Manage Winter and Summer Sports Turf

Outcome 4

Understand the determination and maintenance of the level of quality of sports turf surfaces

Assessment Criteria

The learner can:

1. Evaluate the **benefits** of using PQS to assess the level of quality of a turf surface
2. Explain how to distinguish between **different levels of quality** for specific sports turf surfaces and decide which is acceptable
3. Explain the purposes of **reviewing** material inputs and maintenance operations

Unit content

Benefits

Inform management decisions, determine maintenance requirement accurately, justify purchase of equipment/resources, effective use of inputs, reduced wastage, determine the carrying capacity of the turf

Different levels of quality

Levels of Performance Quality Standards: basic, standard and high

Structural: determines playing quality and impacts on presentational quality e.g. total ground cover, bare areas, desirable grass species, length of herbage, weeds, moss, algae and lichen, root depth, thatch, rootzone medium, evenness, gradient, pests, diseases, infiltration rate

Presentational: e.g. appearance, visibility of and width of markings, surface debris, and sward colour

Playing: e.g. vertical ball bounce, traction, ball roll, spin, hardness

Reviewing

Obtain maximum use from the surface, maximise use of available resources, ensure operations are effective, maximise potential of turf surface, minimise waste and environmental impacts

Unit 342 Manage Winter and Summer Sports Turf

Notes for guidance

The learner will be able to develop the skills and knowledge involved in the management of turf surfaces for winter (golf, football, rugby union, National Hunt racing) and summer sports (golf, bowls, tennis, cricket, rugby league, Flat racing) to a stated level of quality. They will be able to apply the principles of sustainable turf management and collect data using Performance Quality Standards (PQS) to assess the level of quality of the surface. The learner should be able to select and safely use appropriate machines, equipment and materials for these tasks. The unit should cover as wide a range of activities as possible, appropriate to the sports facilities available to the learner.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner may be aware of basic safe working practices with turf maintenance machinery and is likely to be familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery therefore health and safety issues relevant to the operation of the machinery used must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments.

All equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. Adequate Personal Protective Equipment (PPE) appropriate to the learner, the machinery and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1, the learner will develop skills and knowledge in collection and use of PQS data and be able to make an initial assessment of the surface. They will be able to carry out the range of operations required on the surface and understand the reasons for each operation. They will be able to produce a resource file and calendar of work for the surface. Access to appropriate sports facilities is essential to enable the learner to develop the required level of skill.

In Outcome 2, the learner will develop their understanding of soil, weather and climatic conditions and how these can be monitored and assessed. They will evaluate management strategies to deal with the effects of wear and explain the purpose of a calendar of work and resource file. They will require access to current sources of information, Sports Turf Research Institute (STRI) and Institute of Groundsmanship literature will be helpful.

In Outcome 3, the learner will develop skill in monitoring operations and inputs as assessing how each is contributing to the quality. The assessor may wish to set up areas of turf where different operational regimes and levels of inputs can be compared. Monitoring should take place over as long a time as possible and the learner should be encouraged to experiment with different mowing practices, frequencies, heights-of-cut, adjustment and setting up of equipment. Note should be made of the effects of sharp and blunt blades on mowers upon the quality of the turf.

In Outcome 4, the learner will evaluate the benefits of PQS and explain how to decide what is the acceptable level of quality for a specific surface and the purpose of reviewing inputs and operations. The learner will need to practise using PQS to aid understanding and will need access to current sources of information.

A learner working towards level 3 is likely to have experience of maintaining amenity turf. The unit may be delivered by a wide range of techniques, including lectures, supervised practical work, discussions, site visits and research. The learner will require access to specialised literature and other resources. The delivery of this unit may be integrated with the delivery of other units where this is feasible. Current and topical issues regarding turf management should be highlighted as and when they arise.

References

Books

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- Arthur, J. 1997. *Practical Greenkeeping*. Scotland: Royal & Ancient Golf Club of St Andrews. ISBN 0907583121.
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- Brown S. 2009. *Sports Ground Management: A Complete Guide*. Wiltshire: The Crowood Press. ISBN 184797094X.
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- Perris, J. 2008. *All About Bowls: The History, Construction and Maintenance of Bowling*. Yorkshire: The Sports Turf Research Institute. ISBN 1873431066
- Perris, J., Evans, R.D.C. 1996. *The Care of the Golf Course*. 2nd ed. Yorkshire: The Sports Turf Research Institute. ISBN 1873431198.
- Sachs P. 2004. *Managing Healthy Sports Fields*. Sussex: Wiley Publishing. ISBN 0471472697.
- Sports Turf Research Institute. 2005. *STRI Guidelines to Golf Green Construction in the United Kingdom*. Yorkshire: The Sports Turf Research Institute. ISBN 1873431597
- Turgeon A.J. 2009. *Turfgrass Management*. 8th ed. Harlow: Pearson Education. ISBN 0131140000

Websites

www.iog.org

The Institute of Groundsmanship

Unit 343

Undertake Computer Aided Design in Horticulture, Treework and Blacksmithing

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of how to undertake computer aided design in the land-based industries and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

Learners will be able to develop the skills and knowledge to produce professionally presented plans for the land based industries. The learner will produce, edit, modify and print two-dimensional drawings. Learners will also research suitable packages for use within the land-based industries and the hardware requirements necessary to operate them.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will be able to:

1. Be able to produce two-dimensional drawings using a Computer-Aided Design package
2. Be able to edit and modify two-dimensional drawings using a Computer-Aided design package
3. Understand the production and modification of two-dimensional drawings using a Computer- Aided Design package
4. Understand the usefulness of Computer-Aided Design (CAD) packages in the land-based industries

Guided Learning Hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by SEMTA.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 343

Undertake Computer Aided Design in Horticulture, Treework and Blacksmithing

Outcome 1

Be able to produce two-dimensional drawings using a Computer-Aided Design package

Assessment Criteria

The learner can:

1. **Implement graphic illustrative techniques** for geometric shapes, lines, circles and arcs
2. **Select appropriate lines, styles** and types, scales, hatching and patterns
3. **Produce two-dimensional drawings**, incorporating layers and a variety of formal and informal features.
4. **Produce hard copies of drawings**, selecting appropriate paper size, orientation, scale and positioning.

Unit content

Implement graphic illustrative techniques

Conformity and consistency of selected shapes for 2-D and 3-D display

Select appropriate lines styles

Specification of contract, accuracy of information, presentation style and customer expectation

Produce two-dimensional drawing

Drawings to illustrate aspects and appropriate scale of drawings for the site and customer expectation

Produce hard copies of drawings

Appropriate paper size to be selected for the contract site and scale to accurately represent the detail required

Unit 343

Undertake Computer Aided Design in Horticulture, Treework and Blacksmithing

Outcome 2

Be able to edit and modify two-dimensional drawings using a Computer- Aided Design package

Assessment Criteria

The learner can:

1. **Use editing tools** to off-set, trim, array, mirror, extend, rotate, copy, bisect
2. **Modify two-dimensional drawings** by adding and removing items and layers
3. Modify two-dimensional drawings by **manipulating the scale, lines styles, colour, layers, symbols and text sizes and fonts**

Unit content

Use editing tools

Change of aspect

Provide opportunities for development of the initial presentation

Modify two-dimensional drawings

To develop the initial presentation to show three modifications which change significantly the proposed design

Manipulating the scale, lines styles, colour, layers, symbols and text sizes and fonts

To present a final presentation in three different styles using the same initial measurements

Unit 343

Undertake Computer Aided Design in Horticulture, Treework and Blacksmithing

Outcome 3

Understand the production and modification of two-dimensional drawings using a Computer-Aided Design package

Assessment Criteria

The learner can:

1. **Evaluate the techniques and styles** available and their appropriate uses
2. Explain why editing and manipulation may be needed
3. **Explain the use of drawing aids**, including grids, constraints and other tools to aid accuracy
4. **Describe techniques for plotting/printing plans** to different sizes, scales and formats

Unit content

Evaluate the techniques and styles

Evaluate three techniques and three styles available for use with drawings of a site

Explain the use of drawing aids

To efficiently use for different drawing aids associated with a Computer-Aided Design package

Describe techniques for plotting/printing plans

A CAD presentation to be plotted/printed to three different sizes using different scales and paper sizes

Unit 343

Undertake Computer Aided Design in Horticulture, Treework and Blacksmithing

Outcome 4

Understand the usefulness of Computer-Aided Design (CAD) packages in land-based industries

Assessment Criteria

The learner can:

1. **Evaluate Computer-Aided Design (CAD) software packages**, their operating requirements and suitability for use within Horticulture or Treework
2. Explain **the function of components of computer hardware** including, RAM, ROM, monitor types, mouse types, graphics tablets upgrades
3. Explain the **benefits of CAD** for presenting in a professional format
4. Explain the **health and safety** implications of working on CAD

Unit content

Evaluate at least three Computer-Aided Design software packages

Suitability for the land-based industry and specified computer operating systems to include the cost, flexibility, computer requirements, training requirements and presentational possibilities

The function of components of computer hardware

To relate the components of computer hardware to the requirements specifications of the final presentation and a computer operating system

To demonstrate the advantage of regular upgrades to existing technology in the flexibility and quality of the final presentation

Benefits of CAD

Flexibility, ease of change/modifications to meet customer requirements, professional appearance and speed of operation

Health and safety

The correct background lighting, the correct adjustable seating and body posture, hours of use in front of a monitor, antiglare filters to avoid eyestrain and tiltable monitors

Unit 343 Undertake Computer Aided Design in Horticulture, Treework and Blacksmithing

Notes for guidance

Learners will be expected to have a good understanding of using a computer with a modern operating system. The level 2 qualification in key skills /functional skills covering information and communication technology (or other similar qualification) as a prerequisite for this unit is recommended

In Outcome 1 the learner will be able to produce two-dimensional drawings using a recognised Computer-Aided Design package. Learners will be able to select presentational images in order to meet the customer requirements. Learners will develop the skills to photocopy and print the final presentation on appropriate paper and size.

In Outcome 2 learners will develop skills to edit an existing CAD presentation using a range of presentational images including colour symbols and scale proportion.

In Outcome 3 learners will develop the skills of evaluating different techniques and styles of CAD presentation suitable for different requirements. The use of drawing aids to improve accuracy is an important component of this outcome. Learners will be able to efficiently plot and print plans to different sizes using different scales and formats.

In Outcome 4 learners will evaluate three commercially available Computer- Aided Design software packages which will be linked to the operating system of the computer and will be based on the suitability for use within the land-based industry. Learners will understand the important components of the computer which link directly into the ability to operate CAD systems efficiently. The health and safety implications of using the computer with a CAD system operating will be fully assessed and evaluated by the learner.

References

Books

Buitrago, J. 2008. *Computer Graphics for Landscape*. New York: Delmar.

Kalay, Y.E. 2004. *Architecture's New Media: Principles, Theories, and Methods of Computer-aided Design*. Cambridge (USA): MIT Press.

Unit 344

Undertake Contract Management in the Land-based Industries

Level: 3

Credit value: 10

Unit aim

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

The learner will understand the UK planning and legislated regulations and the effects of European law relating to a specific land-based industry. Learners will develop contracts, plan projects and estimate accurately the costing for specified projects

Learning outcomes

There are **five** learning outcomes to this unit. The learner will be able to:

1. Understand UK planning and legislative regulations and the effect of European law relating to a specific land based industry
2. Be able to develop contracts and plan projects
3. Understand the function of preliminaries and specifications
4. Be able to estimate and cost land-based projects
5. Understand the estimation and costing of land-based projects

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 344 Undertake Contract Management in the Land-based Industries

Outcome 1 Understand UK planning and legislative regulations and the effect of European law relating to a specific land-based industry

Assessment Criteria

The learner can:

1. Evaluate the main **legislative framework** relating to a specific land-based industry
2. Describe the **roles of councils and local authorities** in planning and how to obtain planning permission
3. Summarise sources of **grant aid and funding** for land-based projects
4. Describe the roles of **public bodies in influencing projects** within land-based industries

Unit content

Legislative framework

Health and Safety at Work etc Act 1974, Local Government Act 1999, English contract law, Town and Country Planning Act 1971, Treaty of Lisbon: 01/12/09

Roles of councils and local authorities

Responsibilities of councils and local authorities in planning, National and local planning regulations and procedures in the UK

Grant aid and funding

Private grants, Government direct funding and grant aid, Sources of commercial income

Public bodies in influencing projects

Department of the environment, Business Link, Civil Service, Communities and local government, Natural England, Enterprise and business support

Unit 344

Undertake Contract Management in the Land-based Industries

Outcome 2

Be able to develop contracts and plan projects

Assessment Criteria

The learner can:

1. **Prepare contracts** and detailed **specifications** appropriate to specific projects
2. Prepare a **management plan**
3. **Sequence operations** for a land-based scheme
4. Explain the **contracting process**, including types of contract and the roles and responsibilities of those involved

Unit content

Prepare contracts

Presentation/wording of content specifications

Specifications

Sources of reference material/accuracy and relating to the land-based industry e.g. British Standards, Nursery Stock Association

Management plan

Time period, labour, material costings and contingency options

Sequence operations

Order of operations to include rationale and date programming

Contracting process

Fixed-price contracts, unit rate contracts, reimbursable contracts, financing contracts and project management contracts

Unit 344

Undertake Contract Management in the Land-based Industries

Outcome 3

Understand the function of preliminaries and specifications

Assessment Criteria

The learner can:

1. Explain the significance of accurate and detailed **specifications**
2. Evaluate a range of **media** to convey specifications, that is appropriate for a specific land-based industry
3. Summarise the **preliminaries** associated with a specific land based project

Unit content

Specifications

Site dimensions, soil conditions, plant categories, plant sizes/grades

Media

Tender documents, deeds and legal documents, maps and recorded images, British and European standards, horticultural publications and magazines

Preliminaries

Conditions of contract, interpretations/terminology in contract, access arrangements, condition of tendering, working hours, financial arrangements

Unit 344

Undertake Contract Management in the Land-based Industries

Outcome 4

Be able to estimate and cost land-based projects

Assessment Criteria

The learner can:

1. Prepare **Bills of Quantities** which cover all materials and activities appropriate to specific land-based projects
2. Produce **resource estimates** for specific projects
3. Prepare a **schedule of costs** and a quote for specific projects.
4. Explain the stages and techniques in preparing **Bills of Quantity**

Unit content

Bills of quantities

Individual unit costings, sufficient information on the quantities of works to be performed, contract tender and specifications documentation, unit costing of materials and labour for horticultural operations

Resource estimates

Identify resources and acceptable options for project management, standard literature on unit costings for horticultural contracts

Schedule of costs

Direct and indirect costs to include advertisements, printing office costs and labour, materials and tax liabilities

Unit 344

Undertake Contract Management in the Land-based Industries

Outcome 5

Understand the estimation and costing of land-based projects

Assessment Criteria

The learner can:

1. Identify **sources of data** and standard minute values to facilitate the costing of materials and activities
2. Describe how to **calculate the cost** of measured work and non-work items
3. Describe how to **determine a rate** and present costs
4. Explain how to **assess materials** and products for quality, conformity, condition and supply

Unit content

Sources of data

Client information, legal publications, commercial work rate/material costings publications, Government information, planning authorities.

Calculate the cost

Unit costing calculations, standard work rate calculations, trade and retail costs, VAT implications

Determine a rate

State of the market, uniqueness of the contract, specialist staff and/or equipment

Assess materials

Quality measurements e.g. British standards, European quality symbols, contract specifications

Unit 344 Undertake Contract Management in the Land-based Industries

Notes for guidance

This unit will develop and learn the skills and knowledge required to prepare a contract for a land-based project including the preliminaries, specifications, Bills of Quantity and methods of developing the contract. Learners will also have an understanding of how legislation and planning controls will affect projects within the land-based industries.

In Outcome 1, the learner will evaluate the legislative framework affecting a land-based industry. The roles of councils and local authorities in planning will be investigated in order to obtain its planning permission. Public bodies and government departments who have an influence on local and national planning will be reviewed.

In Outcome 2 learners will concentrate on developing the contracts to recorded specifications. This outcome will concentrate on the planning in the short and long-term of the contract to include the roles and responsibilities of those involved in the contract.

In Outcome 3 learners will understand the significance of accurate and detailed specifications. Learners will evaluate a range of media containing specifications for a land-based industry. The importance of preliminaries in order to develop the contract will be investigated fully by the learner.

In Outcome 4 learners will learn the skill of estimation and costing of land-based projects. A bill of quantities will be prepared to cover all materials and activities appropriate to a specified land-based contract. Learners will produce resource estimates and produce a schedule of costs and quotations for a specified landscape project.

In Outcome 5, learners will cover the estimation and costing of land-based projects. The delivery of this outcome will be predominately classroom based, but much of the work will be practically collating sources of data, calculations of cost and determination of a rate and presentation of costs.

References

Books

Saxena, A. 2008. *Enterprise Contract Management*. Fort Lauderdale: J Ross Publishing.

Uher, T.E., Davenport, P. 2009. *Fundamentals of Building Contract Management*. Sydney: UNSW Press.

Unit 345

Manage Heritage Gardens and Arboreta

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of how to manage heritage gardens and arboreta and how this can be applied in practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or further education and training.

The learner will understand the reasons for the development of arboretum or a heritage garden. The learner will collect and collate data relating to an arboretum or heritage garden. The promotion of an arboretum or heritage garden will be fully investigated. Learners will develop a detailed management plan for an arboretum or a heritage garden.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will be able to:

1. Understand the development of arboreta or heritage gardens
2. Be able to collect and collate data relating to an arboretum or heritage garden
3. Be able to promote arboreta or heritage gardens
4. Be able to plan the management of an arboretum or heritage garden

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

n/a

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 345

Manage Heritage Gardens and Arboreta

Outcome 1

Understand the development of arboreta or heritage gardens

Assessment Criteria

The learner can:

1. Summarise the **development of arboreta or heritage gardens** including origins, organisations
2. Review and discuss the **trends in public usage**
3. Evaluate the **benefits and liabilities of public access** to arboreta or heritage gardens.
4. Describe the **salient features** of an arboretum or heritage garden with public access, including **plant collections, internal sources of income, access and transport, visitor facilities.**

Unit Content

Development of arboreta or heritage gardens

Soil and site considerations, historic criteria for development of Heritage Gardens, conservation issues for development, education and research criteria, data collection to include risk assessments

Trends in public usage

Age group of visitors using the facilities, educational use of the facilities

Benefits and liabilities of public access

Revenue from entrance fees and supplementary commercial outlets, health and safety legislation with public access, facility requirement for public access

Salient features

Design of arboretum/heritage garden, sources of income, provision of car parks and visitor facilities

Plant Collections

Identification and display of plants, educational information on plants/plant groups, plants for different soil types, pH and climate

Internal sources of income, access and transport and visitor facilities.

Local and national grants, government funding, commercial income

Unit 345

Manage Heritage Gardens and Arboreta

Outcome 2

Be able to collect and collate data relating to an arboretum or heritage garden

Assessment Criteria

The learner can:

1. Collect and collate **data for a given area of an arboretum or garden** including access, perimeters, biological factors, soil type, aspect, current sources of income
2. Collect and collate **data for specific plants or trees**, including species, number, height, spread, form
3. **Access relevant data** from maps, websites, government departments, local weather data, previous management plans
4. **Explain how data collected can be used** to develop the arboretum or garden

Unit content

Data for a given area of arboreta or heritage garden

Access arrangement for public, soil texture/structure pH, soil profile analysis

Data for specific plants or trees

Plant populations, height, spread, form, evergreen/deciduous and pH preference

Access relevant data

Planning office of local authority, Government organisations, historic references for heritage gardens to include public and private reference collections e.g. Royal Horticultural Society (RHS)

Explain how data collected can be used

Local authority planning regulations, planting schemes to original plans, selection of plants for site requirements

Unit 345

Manage Heritage Gardens and Arboreta

Outcome 3

Be able to promote arboreta or heritage gardens

Assessment Criteria

The learner can:

1. Obtain current **information from customers**
2. Produce a **calendar of activities** to suit all age ranges, levels of interest and physical ability
3. **Plan activity in detail**, including risk assessment, costs, publicity and resources
4. Discuss considerations when planning activities, including commercial viability, child protection issues, visitor impact, access and safety

Unit content

Information from customers

Visitors aim on visiting establishment, expectations on visitor facilities, potential for revisiting, the visitor experience

Calendar of activities

Themed activities relating to seasons, age group of customers attending events, physical participation and lecture presentation

Plan activity in detail

Pre-publicity information, event timetable, resource/cost implications, risk assessment/liabilities, planning regulations, child protection requirements for physical activities, health and safety at work act/contingency planning, management of the visitor/car parking and refreshments, impact on visitor numbers on local infrastructure

Unit 345

Manage Heritage Gardens and Arboreta

Outcome 4

Be able to plan the management of an arboretum or heritage garden

Assessment Criteria

The learner can:

1. Plan a **five-year management plan** for a specific venue, taking into account the impact of public and financial pressures
2. Analyse the **management objectives** of a specific venue and make recommendations for improvement
3. Produce **interpretation material** for public education about the venue.

Unit content

Five-year management plan

Planning regulations, resource implications, infrastructure requirements, staffing and staff training

Management objectives

Aims of the site, public interest, financial investment

Interpretation material

Information material for different age groups and interest/knowledge of the subject

Media material to include publications, visual and interactive formats

Unit 345 Manage Heritage Gardens and Arboreta

Notes for guidance

This unit is designed to equip the learner with the knowledge of how to manage heritage gardens and arboreta. It is important that learners identify appropriate heritage gardens and arboreta which will have availability of data for learners to review. It is strongly recommended that learners visit the heritage garden or arboretum in order to assist their studies. Learners will need to be proactive and to be able to respond to the data on the heritage garden or arboretum in order to develop a full understanding on the aims and objectives of heritage gardens or arboreta.

In Outcome 1, learners will understand why arboreta or heritage gardens have developed. The aim of organisations responsible for heritage gardens or arboreta will be investigated by the learner. The learner will relate public awareness of Heritage Gardens or arboreta to the facilities and resources made available to the general public visiting these sites. The learner will investigate the resources necessary to establish and maintain a heritage garden or arboretum. The financial implications of operating a heritage gardens or arboretum open to the general public will be fully investigated by the learner.

In Outcome 2 learners will identify the appropriate data necessary to evaluate the physical, financial and viability of a heritage garden or arboretum. Learners will relate physical resources to the range of plant material available and to accurately record the physical data to include technical and botanical information. Learners will investigate how collected data from the heritage garden or arboretum can be used constructively to further develop the resources and facilities the benefit of the heritage garden or arboretum.

In Outcome 3 learners will investigate the needs of the customer and relate the needs of the physical resources available at the heritage garden or arboretum. Learners will be proactive in developing a programme of events which will attract a targeted customer range in order to support the aims and objectives of the heritage gardens or arboretum.

In Outcome 4 learners will need to collate all the data collected in order to produce a realistic five-year management plan which clearly makes reference to staffing/volunteers and physical and financial resources necessary to complete recommendations. Learners will review existing management plans in order to relate them to current physical and financial factors. Methods of improving existing management plans the benefit of the heritage garden or arboretum and with specific reference to the visitor will be required. Learners will develop a range of publicity material which is targeted to different visitors groups in order to educate the visitor on the aims and objectives of the heritage gardens or arboretum.

References

Books

Goult, S. 1993. *Heritage Gardens: Care, Conservation and Management*. Oxford: Routledge.

Unit 346

Understand the Principles and Identify the Signs of Pests and Diseases of Trees

Level: 3

Credit value: 10

Unit aim

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

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

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Understand the principles of pathology and the common causes of disease
2. Be able to identify the signs and symptoms of common biotic and abiotic pathogens
3. Understand common biotic pathogens
4. Understand monitoring, prevention and control measures of common biotic pathogens

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

CU80 Plan and manage the control of pests, diseases and disorders

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 346

Understand the Principles and Identify the Signs of Pests and Diseases of Trees

Outcome 1

Understand the principles of pathology and the common causes of disease

Assessment Criteria

The learner can:

1. Summarise the **principles of pathology**
2. Identify the consequences of **pests and diseases for trees**
3. Review the **common causes** of tree diseases

Unit content

Principles of pathology

Requirements for healthy growth of trees, recognition of unhealthy trees, prevention, monitoring, identification of signs and symptoms, diagnosis, treatment, control

Pests and diseases for trees

Consequences: rot, fungal attack, damage, growth reduction, reduced vigour (increased susceptibility to further infection), loss of value, premature death, dangerous trees and risk assessment, loss of aesthetic and amenity value, pest and disease spread, legislative requirements or notifiable pests and diseases

Common causes

Biotic pathogens: bacteria, fungi, vertebrate pests (including humans), invertebrate pests, plants
Abiotic pathogens: lightning, frost, drought, nutrient deficiencies, herbicides, air pollution, wind, planting failure

Unit 346

Understand the Principles and Identify the Signs of Pests and Diseases of Trees

Outcome 2

Be able to identify the signs and symptoms of common biotic and abiotic pathogens

Assessment Criteria

The learner can:

1. Describe the signs and symptoms of **common biotic pathogens**
2. Describe the signs and symptoms of **common abiotic pathogens**
3. **Diagnose** pathogen damage to trees

Unit content

Common biotic pathogens

Bacteria

Fungi: examples of Ascomycetes, Basidiomycetes, Oomycetes

Invertebrate pests: examples of Hemiptera, Hymenoptera, Lepidoptera, Coleoptera

Vertebrate pests: rabbits, grey squirrels, deer

Common abiotic pathogens

Lightning, drought, frost, herbicides, poor soil aeration, nutrient deficiencies, road salt, air pollution

Diagnose

Equipment and sampling, use of identification keys

Unit 346

Understand the Principles and Identify the Signs of Pests and Diseases of Trees

Outcome 3

Understand common biotic pathogens

Assessment Criteria

The learner can:

1. Discuss the **life cycles** of common invertebrate, vertebrate, fungal and bacterial pathogens
2. Explain the **significance of the life cycle for correctly identifying pathogens**
3. Describe host and pathogen **relationships**

Range

Bacteria

Depending upon which qualification is being delivered, one of the following categories needs to be covered:

Fungi: examples of Ascomycetes, Basidiomycetes, Oomycetes

Invertebrate pests: examples of Hemiptera, Hymenoptera, Lepidoptera, Coleoptera

Vertebrate pests: rabbits, grey squirrels, deer

Unit content

Life cycles

Reproduction methods and rates, breeding seasons, behavioural characteristics, growth and development, social structure, preferred habitat, food supply and preferences, natural population controls, mode of movement (insect vectors, wind spores, territory)

Significance of the life cycle for correctly identifying pathogens

Significance: seasonality and timing of signs and symptoms visibility and occurrence (fruitifications, grazing damage)

Consequences of misidentification: financial, legal, environmental, reputation

Relationships

Colonisation and invasion strategies, factors promoting infection, host response mechanisms

Unit 346

Understand the Principles and Identify the Signs of Pests and Diseases of Trees

Outcome 4

Understand monitoring, prevention and control measures of common biotic pathogens

Assessment Criteria

The learner can:

1. Evaluate appropriate **monitoring methods** associated with common biotic pathogens
2. Evaluate appropriate **prevention measures** associated with common biotic pathogens
3. Evaluate appropriate **control measures** associated with common biotic pathogens
4. Produce a **suitable plan** to manage **specified biotic pathogens**
5. Outline the **legal and environmental considerations** associated with control of common biotic pathogens

Range

Bacteria

Depending upon which qualification is being delivered one of the following categories needs to be covered:

Fungi: examples of Ascomycetes, Basidiomycetes, Oomycetes

Invertebrate pests: examples of Hemiptera, Hymenoptera, Lepidoptera, Coleoptera

Vertebrate pests: rabbits, grey squirrels, deer

Unit content

Monitoring methods

Surveys and inspection: faeces, damage, timing, distribution and frequency, visual assessment, decay detection equipment, trapping, approved traps, use of pheromones

Prevention measures

Measures used to promote healthy tree growth: irrigation, feeding, approved repellents, physical barriers, fencing, tree shelters, breeding for natural resistance, species selection, plant passports and import legislation

Control measures

Approved traps, biological control: predators and parasites, shooting and culling, pesticides, fungicides, insecticides, aphicides, rodenticides, poisons, fumigants,

Pruning and sanitation felling, respiratory and Personal Protective Equipment (PPE)

Suitable plan

Plan to include: monitoring, prevention and control methods

Specified biotic pathogens

One example from each of the fungal, invertebrate and vertebrate pathogen species that negatively impact on trees

Legal and environmental considerations

Current legislation: non-target species, environmental effects of control methods, approved products, occupiers' responsibilities to visitors, risk assessment

Pests Act 1954, Plant Health Act 1967, Wildlife and Countryside Act (1981) (as amended 1991), Food and Environment Protection Act 1990 (as amended 1995), Approved Code of Practice for Using Plant Protection Products, Health and Safety at Work etc Act 1974, Control of Substances Hazardous to Health (2002) (COSHH)

Unit 346 Understand the Principles and Identify the Signs of Pests and Diseases of Trees

Notes for guidance

This unit is designed to provide the learner with knowledge and skills required to manage pests and diseases associated with a range of trees appropriate to the area of study. The unit should cover a range of pathogens as appropriate to the area of study as well as those locally or regionally significant to the learner.

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

In Outcome 1, the learner will be required to understand the principles of pathology and the common causes of disease. It is accepted that this outcome will require formal delivery but it should also be delivered in practical situations where learners are visually assessing trees for health and identifying unhealthy trees. The learner should be encouraged to assess a range of tree species appropriate to their area of study, with the emphasis on safe working.

In Outcome 2 the learner will be required to identify the signs and symptoms of common biotic and abiotic pathogens. It is anticipated that the delivery of this unit will require some formal delivery, but it should be delivered in practical situations and be appropriate to the area of study. It is expected that the learner will be given the opportunity to study pathogens throughout the year, with regard to when signs and symptoms may most easily be found. The specific pathogens studied should relate to the learner's area of study and provide the opportunity to become familiar with those which are locally or regionally significant.

In Outcome 3, the learner will be required to understand common biotic pathogens. It is anticipated that the delivery of this unit will require formal delivery and relate primarily to the pathogens the learner has become familiar with in Outcome 2.

In Outcome 4 the learner will be able to understand monitoring, prevention and control measures of common biotic pathogens examined in Outcomes 2 and 3. Emphasis should be placed on current legislation and Codes of Practice, and it would be beneficial to include learning within the wider context of tree health. Reference and links to anatomical features of wood and wound response in trees could be explored. Current and topical issues regarding tree health should be highlighted as they arise.

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

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

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

References

Books

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Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Journals

- Arboricultural Association newsletter
- Forestry and British Timber
- Horticultural Week
- Quarterly Journal of Forestry

Unit 347

Undertake Tree and Shrub Pruning and Maintenance

Level: 3

Credit value: 10

Unit aim

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

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

Learning outcomes

There are **three** learning outcomes to this unit. The learner will:

1. Understand pruning as a means of maintaining trees and shrubs
2. Be able to prune and maintain trees and shrubs
3. Be able to assess trees and shrubs for potential failure

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

TW25 Support arboriculture operations

TW26 Support colleagues undertaking off ground arboriculture operations

TW38 Install structural supports for trees

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 347

Undertake Tree and Shrub Pruning and Maintenance

Outcome 1

Understand pruning as a means of maintaining trees and shrubs

Assessment Criteria

The learner can:

1. Explain the **aims and considerations** of pruning trees and shrubs
2. Evaluate **pruning techniques**
3. Explain the immediate and long term **biological processes** of trees and shrubs in response to pruning and possible consequences of not pruning
4. Summarise the **legislation relating to pruning and maintenance**

Unit content

Aims and considerations

Disease controls, improve formative appearance, restoration, deadwooding, physical access, health and safety, reduce or remove competition (space, nutrients, light), timber quality, financial considerations, client requirements, legislation

Pruning techniques

Timing of operations, natural target pruning, branch collars, branch bark ridge, appropriate tools and equipment, British Standard 3998, crown thinning, crown reduction, crown raising, crown reshaping and formative pruning, crown lifting, deadwooding, brashing, pollarding, coppicing

Biological processes

Pruning concepts in relation to energy use, wound response and closure, storage and mobilisation of energy reserves, impact of age of tree, Compartmentalization of Decay in Trees (CODIT), wound and callus growth

Legislation relating to pruning and maintenance

Stature law examples: felling licenses, planning processes, Conservation areas, Tree Preservation Orders (TPOs), Town and Country Planning Act 1961 (as amended 1990), Town and Country Planning (Trees) Regulations 1999, Forestry Act 1967 (as amended 1991)

Stature law examples: nuisance, liability, high hedges, highway trees, Health and Safety at Work etc Act 1974, Wildlife and Countryside Act (1981) (as amended 1991)

Unit 347

Undertake Tree and Shrub Pruning and Maintenance

Outcome 2

Be able to prune and maintain trees and shrubs

Assessment Criteria

The learner can:

1. Produce a **pruning and maintenance plan** for trees and shrubs
2. Carry out appropriate **pruning and maintenance** of trees and shrubs

Unit content

Pruning and maintenance plan

Survey of tree and shrub condition, tree category classes, maintenance work required, prioritisation of work, protection measures, schedule of works

Pruning and maintenance

Select appropriate methods (manual, motor-manual) and equipment, correct working techniques, correct pruning techniques, correct operation of equipment, safe working practices, appropriate disposal of waste, prevention of pollution, minimise environmental impact

Unit 347

Undertake Tree and Shrub Pruning and Maintenance

Outcome 3

Be able to assess trees and shrubs for potential failure

Assessment Criteria

The learner can:

1. Explain the **potential of trees and shrubs for failure**
2. Carry out **assessment** of trees and shrubs for potential failure
3. Evaluate **remedial actions** for potential failure
4. **Carry out appropriate remedial action** on trees and shrubs

Unit content

Potential of trees and shrubs for failure

Decay, structural weaknesses, species characteristics, injury, growth habit, site and environmental influences and factors

Assessment

Invasive and non-invasive methods, visual inspection, Visual Tree Assessment (VTA), recognition of defects, sounding and acoustics, increment corer, fractometer, resistograph and electrical resistance

Remedial actions

Invasive and non-invasive methods, cable bracing, flexible bracing, rod bracing, propping, guying, felling, pruning

Carry out appropriate remedial action

Site inspection, select appropriate methods and equipment, select appropriate technique, correct working techniques, correct operation of equipment, safe working practices, Personal Protective Equipment (PPE), emergency communications, signage, barriers), work to specifications, appropriate disposal of waste, prevention of pollution, minimise environmental impact

Unit 347 Undertake Tree and Shrub Pruning and Maintenance

Notes for guidance

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

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

Any legal permission required to prune trees must be obtained and equipment/machinery used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998. If chainsaws are used, the learner must hold a Certificate of Competence in Chainsaw and Related Operations (units CS30 and CS31) or equivalent QCF units (CS0960 and CS0961) before working towards achieving this unit.

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

In Outcome 1, the learner will be required to understand how pruning is used to maintain trees and shrubs. It is accepted that this outcome will require formal delivery but it should also be delivered in practical situations where the learner is able to see how different environmental conditions influence tree growth and development. The learner should be encouraged to assess a range of trees and shrubs appropriate to their area of study. The learner will be able to understand UK legislation relating to pruning and maintenance of trees. Examples of real cases should be examined to illustrate the legislation and preparation or completion of appropriate documentation, such as objections to tree preservation orders (TPO) or applications to undertake pruning works. Learners should focus upon legislation specific to their location within the UK and understand the importance of maintaining an awareness of current legislation and Codes of Practice which may relate to tree pruning.

In Outcome 2 the learner will be required to plan and undertake pruning of trees and shrubs. It is anticipated that the delivery of this outcome will be in practical situations and appropriate to the area of study. It is not a requirement for the learner to climb or use other mechanisms to access tree crowns to undertake pruning for this outcome.

In Outcome 3, the learner will be required to assess trees and shrubs for potential failure. It is anticipated that the delivery of this outcome will require some formal delivery, but it should be delivered in practical situations and appropriate to the area of study. The learner is required to erect structural supports in addition to pruning as remedial actions. Potential to erect structural supports will vary according to the trees available and associated requirements, but the learner should install at least two types of support. Simulation within realistic working environments may be used if real-work opportunities are not available. It would be beneficial

to include learning within the wider context of potential failure. Reference and links to current biomechanical theories explaining tree structure and development would enhance the learner's understanding.

This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations or the Level 3 Certificate of Competence in the Thorough Examination of Arboricultural Equipment.

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

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

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

References

Books

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

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Journals

Arboricultural Advisory Information Service publications

Arboricultural Association newsletter

Forestry and British Timber

Journal of Arboriculture

Quarterly Journal of Forestry

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Unit 348

Undertake Advanced Arboricultural Practices

Level: 3

Credit value: 10

Unit aim

This unit aims to provide learners with an understanding of advanced arboricultural practices and how these can be put into practice. This unit is primarily aimed at learners within a centre-based setting looking to progress into the sector or to further education and training.

The learner will safely climb trees and select and use appropriate equipment to inspect trees as well as undertake a range of preventative and remedial operations. The range of pruning cuts and techniques will be examined in conjunction with trees' responses to wounding, with emphasis on how to relate this to the tree care decision making process. In addition, the learner will undertake advanced felling techniques and dismantle trees.

Learning outcomes

There are **three** learning outcomes to this unit. The learner will:

1. Be able to carry out aerial inspections of trees
2. Be able to carry out pruning operations within tree canopies
3. Understand how to dismantle trees

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

TW26 Support colleagues undertaking off ground arboricultural operations

TW30 Carry out aerial pruning of a tree from a rope and harness

TW41 Survey and inspect trees

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 348

Undertake Advanced Arboricultural Practices

Outcome 1

Be able to carry out aerial inspections of trees

Assessment Criteria

The learner can:

1. Discuss factors relevant to the inspection of trees from the ground
2. Carry out a **pre-climbing assessment of a tree**
3. Review the **methods and equipment commonly used to safely access, position and move within the canopy of a tree**
4. **Select and inspect appropriate specialist equipment and working methods to access trees safely and move effectively within the canopy**
5. **Access the canopy of the tree safely and effectively move within the canopy to inspect trees**
6. Assess trees requiring preventative or remedial works and **produce a schedule of work** to meet the requirements for those trees

Unit content

Pre-climbing assessment of a tree

Identification of hazards and risk levels: site and ground conditions, weather conditions, tree condition, task, public access and rights of way/highways, power lines, noise levels

Risk control and reduction: establishment of safety zones, emergency procedures, rescue equipment, first aid provision, refuelling site, Personal Protective Equipment (PPE)

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Methods and equipment commonly used to safely access, position and move within the canopy of a tree

Safe access methods: ladders, Mobile Elevated Work Platforms (MEWPs), rope and harness, throwlines, climbing irons

Climbing and lowering ropes: static, semi-static, dynamic

Climbing knots: prussik, bowline, figure-of-eight

Harnesses, karabiners, strops, slings, throwlines, friction devices, rope grabs, cambium savers, pulleys

Select and inspect appropriate specialist equipment and working methods to access trees safely and move effectively within the canopy

Select working methods: access methods, work positioning systems

Select and inspect equipment: equipment appropriate to selected working methods, definition and status of a 'competent person', requirements for independence

Certificates of Conformity, categories of equipment, appropriate examination intervals, marking of individual items of equipment, wear patterns and types of damage, wear limits and tolerances

Access the canopy of the tree safely and effectively move within the canopy to inspect trees Access and move within the canopy: selection of appropriate anchor points and supplementary anchor points, changing of anchor points, rope organisation, branch walking, controlled descent, retrieval and correct storage of equipment
Inspect trees: tree health and condition, decay detection, signs and symptoms of pests and pathogens, tree dimensions, mechanical defects

Produce a schedule of work

Method statement and tree work specifications: tree pruning or removal, pest or pathogen monitoring, control or prevention, prioritisation of work

Unit 348

Undertake Advanced Arboricultural Practices

Outcome 2

Be able to carry out pruning operations within tree canopies

Assessment Criteria

The learner can:

1. Summarise **current codes of practice and legislation appropriate to aerial tree works**
2. Explain the **variety and appropriateness of pruning cuts**
3. Explain how current theory on wound responses in trees informs and directs pruning methods and techniques
4. Review **specialist equipment and techniques** available for **aerial tree works**
5. Select and inspect appropriate specialist equipment and working methods to access trees safely and move effectively to carry out preventative and remedial pruning in tree canopies
6. Access the canopy of the tree safely and effectively move within the canopy to carry out preventative and remedial pruning in tree canopies

Unit content

Current codes of practice and legislation appropriate to aerial trees works

Town and Country Planning Act 1961 (as amended 1990), Town and Country Planning (Trees) Regulations 1999, Provision and Use of Work Equipment Regulations 1998 (PUWER), Lifting Operations and Lifting Equipment Regulations 1998 (LOLER), Work at Height Regulations 2005, Health and Safety at Work etc Act 1974, Management of Health and Safety at Work Regulations 1992 (as amended 1999), Wildlife and Countryside Act (1981) (as amended 1991, Countryside and Rights of Way Act 2000

Requirements for inspection of equipment, risk assessments, Personal Protective Equipment (PPE), establishment of safety zones, emergency procedures, rescue equipment, first aid provision, appropriate disposal of waste, protected species, definition of 'reckless', prevention of pollution, minimise environmental impact

British Standard 3998, AFAG Safety Guides

Variety and appropriateness of pruning cuts

Timing of operations, natural target pruning, branch collars, branch bark ridge, appropriate tools and equipment, British Standard 3998, crown thinning, crown reduction, crown lifting, brashing, pollarding, coppicing, deadwooding

Specialist equipment and techniques

Access: climbing equipment (ropes, knots, friction devices and harness), ladders and use of Mobile Elevated Work Platforms (MEWPs)

Pruning equipment: secateurs, loppers, hand saws, pole saws, chainsaws, pole chainsaws

Appropriateness, ease of use and access, legislative requirements

Movement within the tree: changing of anchor points, re-directs, additional aids (slings, strops)

Communication with ground staff

Lowering of limbs and prunings

Aerial tree works

Pruning: preventative and remedial

Preventative and remedial pruning

Crown-lifting, crown-thinning, crown-reduction, crown-cleaning, pollarding, reshaping

Unit 348

Undertake Advanced Arboricultural Practices

Outcome 3

Understand how to dismantle trees

Assessment Criteria

The learner can:

1. Describe the **tools and equipment available for dismantling trees, in a variety of situations**
2. **Select and inspect appropriate specialist equipment** to dismantle trees
3. **Access the canopy of trees safely and effectively move within the canopies to remove all branches**
4. Explain how to remove branches and **fell the main stems**

Unit content

Tools and equipment available for dismantling trees, in a variety of situations

Cutting equipment: chainsaws, secateurs, handsaws, loppers, polesaws

Access and lowering equipment: harnesses, lowering and climbing ropes, knots, karabiners, ladders, cranes, climbing irons, strops, slings, throwlines, friction devices, rope grabs, cambium savers, pulleys

Select and inspect appropriate specialist equipment

Select specialist equipment: chainsaws, secateurs, handsaws, loppers, polesaws, lowering and climbing ropes, friction devices, climbing irons, harnesses, karabiners, strops, slings, throwlines, friction devices, pulleys

Inspect equipment: equipment appropriate to selected working methods, definition and status of a 'competent person', requirements for independence, Certificates of Conformity, categories of equipment, appropriate examination intervals, marking of individual items of equipment, wear patterns and types of damage, wear limits and tolerances

Access the canopy of trees safely and effectively move within the canopies to remove all branches Access and work positioning within the canopy: safe ascent, selection of appropriate anchor points and supplementary anchor points, changing of anchor points, rope organisation, branch walking, controlled descent, retrieval and correct storage of equipment

Branch removal: select appropriate equipment, correct working techniques, correct cutting techniques, correct operation of equipment, safe working practices, safe lowering of cut material, appropriate disposal of waste, prevention of pollution, minimise environmental impact

Fell the main stems

Selection of felling direction and lowering where appropriate, safe and efficient chainsaw operation, appropriate Personal Protective Equipment (PPE) worn, appropriate work positioning, monitoring of chainsaw performance, appropriate sequence of cuts, adequate hinge, effective communications, awareness of hazards and escape routes, safe working distances, use of felling aids, work site left in a safe and tidy condition

Unit 348 Undertake Advanced Arboricultural Practices

Notes for guidance

This unit is designed to provide the learner with knowledge and the skills required to safely undertake advanced arboricultural operations. Consideration should be given to the seasonal nature and timing of tree inspections, with regard to when signs and symptoms may most easily be found.

Throughout the unit, the emphasis should be on safe working. It is expected that the learner will be aware of basic safe working practices in chainsaw and aerial treework, as well as familiar with accepted practices and behaviours within the context in which they are working. It is a requirement for the learner to operate machinery and climb trees, therefore health and safety issues relevant to the operation of the machinery used and aerial treework must be stressed and regularly reinforced. The learner should be actively involved in comprehensive risk assessments. Learners must hold the relevant Certificate of Competence in the Safe Use of Chainsaws if they are using one.

Any legal permission required to prune or fell trees must be obtained and equipment/machinery being used must comply with relevant requirements of the Provision and Use of Work Equipment Regulations (PUWER) 1998 and Lifting operations and Lifting Equipment Regulations 1998 (LOLER). Adequate Personal Protective Equipment (PPE) appropriate to the learner, the equipment and the task must be provided and worn in accordance with the associated risk assessment, industry guidance and operator's manual.

In Outcome 1, the learner will be required to carry out aerial inspections of trees. It is anticipated that the delivery of this outcome will be delivered through supervised practical training and the learner will be able to consolidate operational skills within realistic working environments. It is expected that the learner will be given access to appropriate climbing and access equipment to undertake this outcome and to have received sufficient preparatory training in safe tree climbing and work positioning techniques. The learner should be encouraged to inspect trees within a range of management situations and meet with Local Planning Authority tree officers and statutory undertakers to discuss real case studies of the need for tree inspections.

In Outcome 2, the learner will be required to carry out pruning operations within tree canopies. It is anticipated that the delivery of this outcome will be delivered through supervised practical training and the learner able to consolidate operational skills within realistic working environments. It is necessary for the learner to be given access to appropriate climbing and access equipment to undertake this outcome and to have received sufficient preparatory training in the safe use of tree climbing, pruning equipment and work positioning. It is also necessary for the learner to be given the opportunity to undertake a range of types of pruning work in realistic working environments.

In Outcome 3, the learner will be required to dismantle trees. It is anticipated that the delivery of this outcome will be delivered through supervised practical training and the learner able to consolidate operational skills within realistic working environments. It is necessary for the learner to be given access to appropriate climbing and access equipment to undertake this outcome and to have received sufficient preparatory training in safe tree climbing, chainsaws and work positioning techniques. It is also necessary for the learner to be given the opportunity to dismantle a range of trees in realistic working environments.

In Outcomes 1, 2 and 3 the learner must not be required to work on hazardous trees or work sites where the level of risk is deemed to be unacceptable.

A learner working towards level 3 is likely to have experience of practical arboricultural activities. This unit aims to develop the learner's knowledge and skills involved with the safe use of chainsaws, tree climbing and related operations.

This unit will **not** directly lead to certification of competence in the Level 2 Award in Chainsaw and Related Operations. This unit could be used to contribute towards preparative training for the Level 2 Award in Chainsaw and Related Operations or the Level 3 Certificate of Competence.

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

Emphasis should be placed upon 'doing' and developing practical experience, the learner should be given appropriate time to develop their skills. It is important that the learner understands the importance of maintaining an awareness of current legislation and Codes of Practice in relation to tree climbing and related operations.

Centres are encouraged to introduce employers and specific professionals from the arboricultural industry, such as contractors and consultants to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites and trade shows to add depth to the learner experience. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of aerial arboricultural work and the limitations imposed by bad weather.

It is accepted that formal lectures are necessary at level 3 but for this unit it is recommended that they are linked directly with interactive practical lessons in a real environment. The learner should be given the opportunity to undertake a range of arboricultural operations on different sites and situations which reflects current industry practice.

References

Books

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Journals

Arboricultural Advisory Information Service publications
Arboricultural Association newsletter
Journal of Arboriculture

Unit 349

Understand and Carry Out Identification, Planting and Care of Trees

Level: 3

Credit value: 10

Unit aim

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

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

Learning outcomes

There are **five** learning outcomes to this unit. The learner will:

1. Be able to identify trees and shrubs
2. Understand the site and establishment requirements of trees
3. Be able to plant trees and shrubs
4. Understand the planting of trees and shrubs
5. Know the aftercare requirements of trees and shrubs

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

T6 Plant trees

T7 Carry out post-planting protection and maintenance

T8 Control unwanted plant growth around trees

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge.

Unit 349 Understand and Carry Out Identification, Planting and Care of Trees

Outcome 1 Be able to identify trees and shrubs

Assessment Criteria

The learner can:

1. Identify 40 trees and 30 shrubs by **botanical names**
2. Explain the classification of trees, from kingdom to variety and cultivar, and including inter-specific and bi-generic hybrids
3. Describe botanical and morphological **features that aid identification** in all seasons
4. Use keys and other information to identify plants by **botanical characteristics**

Unit content

Botanical names

Binomial scientific names: Genus and specific epithet

Features that aid identification

Features: leaves, buds, twigs, bark, flowers, fruit, petioles, shape, form, height, summer and winter appearance

Botanical characteristics

Leaves: form, shape, arrangement, base, tip, margin, buds, twigs, bark, flowers, fruit, petioles

Unit 349

Understand and Carry Out Identification, Planting and Care of Trees

Outcome 2

Understand the site and establishment requirements of trees

Assessment Criteria

The learner can:

1. Evaluate the **suitability of trees and shrubs** in relation to the following conditions:
 - Climatic and microclimate
 - Soil and drainage
 - Environmental
 - Feasibility and cost-effectiveness
2. Evaluate the **aesthetic value of trees and tree and shrub combinations**
3. Explain the **influence of infrastructure on the selection of trees and shrubs**
 - Rural/urban
 - Underground and overground services
 - Paths, highways, right-of-way
4. Describe the **plant factors that influence selection**, size and shape, seasonal nuisance, arboricultural or silvicultural merit

Unit content

Suitability of trees and shrubs for a variety of conditions

Conditions: exposed sites, confined sites, weedy sites, compacted soils, poor drainage/wet sites, shallow soil depth, dry acid soils, clay and sandy soils

Aesthetic value of trees and tree and shrub combinations

Significance of form and habit, balance between variety and harmony, design principles, viewpoints, landscape character analysis

Influence of infrastructure on the selection of trees and shrubs

Infrastructure: underground and overhead services, highways, footpaths, rights of way, wayleaves, building foundations

Plant factors that influence selection

Factors: ultimate size, shape, seasonal colour, flowering period, hardiness, ability to cope with site specific conditions, aesthetic value, root spread, fruit production, possible seasonal nuisance, arboricultural or silvicultural merit

Unit 349 Understand and Carry Out Identification, Planting and Care of Trees

Outcome 3 Be able to plant trees and shrubs

Assessment Criteria

The learner can:

1. **Plant bare-root transplants**, whips and standards safely
2. Plant **containerised** woody plants safely
3. Provide **appropriate support and immediate aftercare** to trees safely
4. Comply with health and safety and environmental legislation while planting trees and shrubs

Unit content

Plant bare-root and containerised stock safely

Undertake site clearance and preparation works: correct operation of appropriate manual, motor-manual or mechanised methods (dig, plough, rotavate, scarify, chip)

Maintain planting equipment: inspect and adjust, service, clean and store

Appropriate planting method: Mound planting, notch, pit planting, tree spades

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

Appropriate support and immediate aftercare

Support: stakes, frames, guys, ground anchors, treeshelters

Aftercare: fertilisers, irrigation, pruning, pesticides, mulch

Unit 349

Understand and Carry Out Identification, Planting and Care of Trees

Outcome 4

Understand the planting of trees and shrubs

Assessment Criteria

The learner can:

1. Review the categories of **planting stock**
2. Evaluate the **equipment available for planting trees** and the suitability of specific equipment for different situations
3. Evaluate the use of **conditioners and ameliorants in tree planting**, including fertilizers, organic materials, mycorrhizae, water retention materials

Unit content

Planting stock

Stock types: transplants, undercut, cuttings, plugs, whips, feathered trees, light standard, standard, heavy standard, semi mature

Stock categories: bare-root, root balled, containerised

Equipment available for planting trees

Manual spade types for different conditions: Standard, Schlick, Mansfield, graft, spike

Tree planting machines: Hydraulic tree spades, rotary planters, augers

Conditioners and ameliorants in tree planting

Conditioners and ameliorants: fertilisers, organic materials, mycorrhizae, water retention materials

Unit 349

Understand and Carry Out Identification, Planting and Care of Trees

Outcome 5

Know the aftercare requirements of trees and shrubs

Assessment Criteria

The learner can:

1. Describe **methods of protecting trees**, including shelters, fences, tree cages, tree guards
2. Review the **use of tree supports**, including function and types available
3. Describe the **aftercare requirements of trees**, including inspection, nutrition, watering, mulching, adjustment/removal of supports

Unit content

Methods of protecting trees

Protection methods: treeshelters, fencing, guards, mulching, tree cages

Use of tree supports

Supports: guys, anchors, stakes, guards

Aftercare requirements of trees

Aftercare: inspection, beating-up, nutrition, formative pruning requirements, irrigation, mulching, adjustment/removal of support, weeding/competition management, use of pesticides

Notes for guidance

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

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

In Outcome 1, the learner will be required to identify trees and shrubs. It is accepted that this outcome will require formal delivery but it should be primarily delivered in practical situations. Learners should be given sufficient opportunity to identify a wide range of woodland and amenity trees in their growth and dormant stages. Learners should be encouraged to collect and preserve specimens as a means of improving their identification skills.

In Outcome 2 the learner will be required to understand the site and establishment requirements of trees appropriate to their area of study. It is anticipated that the delivery of this outcome will require some formal delivery, but it should be primarily delivered in practical situations. The learner should be given the opportunity to study the interaction between trees and infrastructure, as well as successful and unsuccessful planting combinations.

In Outcome 3, the learner will be required to successfully plant trees and shrubs. The range of planting stock may vary according to the planting site and associated specification, but this work should be undertaken on a minimum of two different sites. The learner should have access to sufficient planting stock and equipment in a realistic industrial situation.

In Outcome 4, the learner will be required to understand the planting of trees and shrubs. It is anticipated that the delivery of this outcome will require some formal delivery, but it should be primarily delivered in practical situations. The learner should be able to study a wide range of site conditions and planting requirements that will inform the choice of tree species, as well as the choice of planting methods and stock.

In Outcome 5, the learner will be required to know the aftercare requirements of trees and shrubs. It is anticipated that the delivery of this outcome will require some formal delivery, but it should be primarily delivered in practical situations. The learner should be given the opportunity to visit established planting schemes and review the range of aftercare, support and protection methods and techniques available.

A learner working towards level 3 is likely to have experience of practical. This unit aims to extend the learner's knowledge and skills involved with ensuring the successful planting and aftercare of healthy trees and shrubs. Emphasis should be placed not only on 'doing', but also upon the importance of planning and strategies to ensure safe, efficient and effective operations. It is important that the learner understands the importance of maintaining an awareness of current legislation and Codes of Practice in relation to planting and aftercare work.

Centres are encouraged to introduce employers and specific professionals from industries, such as planting contractors and landscape architects, to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of working sites, such as tree nurseries, as well as trade shows to add depth to the learner experience. In addition, current and topical issues regarding tree planting and aftercare should be highlighted as and when they arise.

It is anticipated that this unit will be delivered through supervised practical training and the learner able to consolidate operational skills within realistic working environments. The unit should be delivered throughout the year, with consideration given to appropriate seasonal aspects of tree planting and the impact of weather extremes on operations.

It is accepted that formal lectures will be necessary at level 3 but for this unit it is recommended that they are linked directly with interactive practical lessons in a real environment. The learner must be given the opportunity to work with a range of planting stock in different situations which reflects current industry practice.

References

Books

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- Pepper, H.W. 1992 *Forest Fencing*. Forestry Commission, ISBN 0855386886
- Pepper, H.W. 1998 *The Prevention of Rabbit Damage to Trees in Woodland*. Forestry Commission, ISBN 0855383720
- Pepper, H.W. 1999 *Recommendations for Fallow, Roe and Muntjac Deer Fencing: New Proposals for Temporary and Reusable Fencing*. Forestry Commission, ISBN 0855385057
- Potter, M.J. 1991 *Treeshelters*. Forestry Commission, ISBN 0117102881
- Trout, R.C. 2006 *Forest Fencing*. Forestry Commission, ISBN 0855386886

Arboriculture and Forestry Advisory Group (AFAG) Safety Guides

Journals

Arboricultural Association newsletter

Unit 350

Understand the Principles and Carry out the Practice of Wildlife Population Surveys, Ecology and Conservation

Level: 3

Credit value: 10

Unit aim

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

The unit aims to enable the learner to be able to identify and conduct surveys of wildlife habitats and ecosystems. It will consider fluctuations in ecosystems and the reasons for these fluctuations, both natural and human influenced. Learners will also understand the wildlife populations within ecosystems, the interactions between these and the conservation strategies used to preserve ecosystems.

Learning outcomes

There are **four** learning outcomes to this unit. The learner will:

1. Understand changes in global ecosystems
2. Understand national and international conservation strategies for wildlife and their habitats
3. Understand population dynamics
4. Be able to conduct a field study of habitats and wildlife populations

Guided learning hours

It is recommended that **60** hours should be allocated for this unit. This may be on a full-time or part-time basis.

Details of the relationship between the unit and relevant national occupational standards

EC2 Survey and report on the condition of the environment

EC6 Communicate environmental information

EC23 Prepare, conduct and report on field surveys

Endorsement of the unit by a sector or other appropriate body

This unit is endorsed by Lantra SSC.

Assessment and grading

This unit will be assessed by:

- An assignment covering practical skills and underpinning knowledge

Unit 350

Understand the Principles and Carry out the Practice of Wildlife Population Surveys, Ecology and Conservation

Outcome 1

Understand changes in global ecosystems

Assessment Criteria

The learner can:

1. Explain **global changes** in ecosystems
2. Illustrate **wildlife population changes** in ecosystems
3. Assess **reasons for global wildlife population fluctuations**

Unit content

Global changes

Population shifts, trends, speciation, scales, individuals, species, communities, ecological niches, demes, climate change, drought, famine

Wildlife population changes

Metapopulations, seasonality, growth, dissolution, dispersal, genetic variability, continuity in time, fecundity, natality, mortality

Reasons for global wildlife population fluctuation

Seasonality, migration, emerging diseases, climate change, habitat destruction, influence of man

Unit 350 Understand the Principles and Carry out the Practice of Wildlife Population Surveys, Ecology and Conservation

Outcome 2 Understand national and international conservation strategies for wildlife and their habitats

Assessment Criteria

The learner can:

1. Review **national conservation strategies** for wildlife and their habitats
2. Discuss **international conservation strategies** for wildlife and their habitats

Range

Conservation strategies: in situ and ex situ conservation

Unit content

National conservation strategies

Current applicable conservation strategies: biodiversity action plans, Wildlife Trust, National Wildlife Federation, Royal Society for the Protection of Birds (RSPB), application of relevant legislation (Environment Act (1995), Wildlife and Countryside Act 1981 (as amended 1991))

International conservation strategies

Current applicable conservation strategies: charity strategies, International Union Conservation of Nature (IUCN), endangered species international, Worldwide Fund for Nature (WWF), International Wildlife Conservation Society, application of the Convention on International Trade in Endangered Species (CITES), UN Convention on Biodiversity, Conservation (Natural Habitats etc) Regulations 1994

Unit 350

Understand the Principles and Carry out the Practice of Wildlife Population Surveys, Ecology and Conservation

Outcome 3

Understand population dynamics

Assessment Criteria

The learner can:

1. Explain **predator prey interactions** within wildlife populations
2. Discuss **types of evolution** within animal populations

Unit content

Principles of population dynamics

Growth, dispersion, genetic variability, continuity in time, factors that influence population, size, form, resources, demes, fluctuations, fecundity, natality, mortality, immigration, emigration, breeding strategies (r and K)

Predator prey interactions

Positive and negative interactions, primary consumers, secondary consumers, parasite: host, natural selection, hunting strategies, predation theories, predator density and prey density, prey defences

Types of evolution

Divergent, convergent, parallel

Unit 350

Understand the Principles and Carry out the Practice of Wildlife Population Surveys, Ecology and Conservation

Outcome 4

Be able to conduct a field study of habitats and wildlife populations

Assessment Criteria

The learner can:

1. **Plan an ecological survey** of habitats
2. Carry out an **ecological survey** of habitats
3. Carry out a **wildlife population survey**

Unit content

Plan an ecological survey

Objective setting and planning, risk assessment, health and safety, legislation, codes of practice

Ecological survey

Sampling (quadrat, kick, transect), data analysis methods

Wildlife population survey

Phase 1 surveys, habitat surveys, species surveys

Unit 350

Understand the Principles and Carry out the Practice of Wildlife Population Surveys, Ecology and Conservation

Notes for guidance

This unit is designed to provide an overview of the principles of ecology and conservation that influence wildlife populations at a National and International level.

The unit should consider a range of wildlife populations in a variety of habitats (mammals, reptiles, amphibians, invertebrates, birds) within the British Isles and on the International stage. It should aim to incorporate historic, current and emerging issues in wildlife population dynamics and conservation to enable the learner to fully develop a worldwide perspective on conservation issues and strategies developed to counteract them.

Throughout the unit the emphasis should be on the contextualisation of the principles of population dynamics discussed into real world examples to enable the learner to fully engage with the concepts discussed and current issues. Safe working practices and compliance with relevant legislation, codes of practice and health and safety should be emphasised before and during practical surveying.

Outcome 1 encourages the identification and exploration of global and national ecosystems and to identify how these have and are currently evolving. Specific emphasis should be given to changes in wildlife population changes and the potential abiotic and biotic factors that produce these fluctuations. Delivery is expected to be formal but should be complimented by the inclusion of interactive resources including videos and case studies to encourage the learner to contextualise.

In Outcome 2, the learner will develop an understanding of both National and International conservation strategies. Delivery should provide an overview of historic and current strategies and how these interlink. Learners should be encouraged to apply conservation strategies to biodiversity action plans and conservation objectives, and should be able to discuss their potential impact. Delivery is envisaged to be a combination of formal and interactive sessions, and the inclusion of guest speakers or case studies which can contextualise conservation strategies is to be encouraged.

Outcome 3 encourages the exploration of the principles of population dynamics and should be discussed with reference to a range of examples, and should include consideration of the interrelationship of plant and animal (mammals, birds, invertebrate, amphibian and reptile) species. The learner will explore evolutionary strategies to propose how current population dynamics have formed. Delivery is expected to be formal but should be complimented by practical activities, videos and case studies to encourage the learner to contextualise the factors covered. Current and topical issues in population dynamics and conservation should be highlighted.

Outcome 4 continues with the development of practical ecological surveying skills. Practical field study opportunities to develop core skills are necessary to compliment formal delivery. A range of habitats that incorporate access to numerous wildlife species should be available for study and a variety of sampling methods practically undertaken. Learners should be encouraged to plan, undertake and reflect on sampling in reference to method, sources of error, results, conclusions drawn, legislation and health and safety.

Learners working towards Level 3 are expected to have underpinning knowledge in British wildlife and plant identification and should be able to relate this to ecological surveying: Personal interest in current and emerging issues in conservation is envisaged. The unit aims to build upon foundation knowledge to discover the complex relationships that exist within global ecosystems in the natural world and how these influence population dynamics. Learners are required to be able to review ecosystems and to formulate possible explanations for current population dynamics and trends within these. The learner will develop knowledge of

the application of conservation strategies for wildlife and habitat preservation at both a national and International level. It is expected that delivery will be formal but emphasis should be placed on the development of practical surveying skills and ability to interpret the results of surveys and contextualise these into short and long term impacts on populations and ecosystems. It is important that the learner understands the influence of legislation, codes of practice and health and safety in respect of ecological surveying.

Centres are encouraged to introduce case studies from real environments and guest speakers from relevant industries e.g. Wildlife Trust to provide interesting and relevant information to the learner. Teaching would also benefit from visits to a variety of habitats to add depth to the learner experience. It is accepted that formal lectures will be necessary at Level 3 but for this unit it is necessary to compliment this with practical opportunities and recommended to introduce interactive sessions in a real environment and integrate the appraisal of population case studies with respect to conservation at both national and international levels.

References

Books

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Krebs, JR Davies, B 1997. *Behavioural Ecology: An evolutionary approach*. Wiley Blackwell: UK ISBN: 0632035463

Journals

Journal of Ecology

Ecology

Behavioural Ecology

Ecologist

BBC Wildlife

Birds

Forest Life

Shooting and conservation

Websites

www.ecology.com

www.nhm.ac.uk/research-curation/projects/worldmap

www.globalissues.org.uk

www.ukbap.org.uk

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Appendix 1 Relationships to other qualifications

Literacy, language, numeracy and ICT skills development

These qualifications include opportunities to develop and practise many of the skills and techniques required for success in the following qualifications:

- Functional Skills (England) – see www.cityandguilds.com/functionalskills
- Essential Skills (Northern Ireland) – see www.cityandguilds.com/essentialskillsni
- Essential Skills Wales – see www.cityandguilds.com/esw

There might also be opportunities to develop skills and/or portfolio evidence if learners are completing any Key Skills alongside these qualifications.

Appendix 2 Sources of general information

The following documents contain essential information for centres delivering City & Guilds qualifications. They should be referred to in conjunction with this handbook. To download the documents and to find other useful documents, go to the **Centres and Training Providers homepage** on www.cityandguilds.com.

Providing City & Guilds qualifications – a guide to centre and qualification approval contains detailed information about the processes which must be followed and requirements which must be met for a centre to achieve 'approved centre' status, or to offer a particular qualification. Specifically, the document includes sections on:

- The centre and qualification approval process and forms
- Assessment, verification and examination roles at the centre
- Registration and certification of learners
- Non-compliance
- Complaints and appeals
- Equal opportunities
- Data protection
- Frequently asked questions.

Ensuring quality contains updates and good practice exemplars for City & Guilds assessment and policy issues. Specifically, the document contains information on:

- Management systems
- Maintaining records
- Assessment
- Internal verification and quality assurance
- External verification.

Access to Assessment & Qualifications provides full details of the arrangements that may be made to facilitate access to assessments and qualifications for learners who are eligible for adjustments in assessment.

The **centre homepage** section of the City & Guilds website also contains useful information such on such things as:

- ***Walled Garden***
Find out how to register and certificate learners on line
- ***Events***
Contains dates and information on the latest Centre events
- ***Online assessment***
Contains information on how to register for GOLLA assessments.

Useful contacts

Type	Contact	Query
UK learners	T: +44 (0)84 4543 0033 E: learnersupport@cityandguilds.com	<ul style="list-style-type: none">• General qualification information
Centres	T: +44 (0)84 4543 0000 F: +44 (0)20 7294 2413 E: centresupport@cityandguilds.com	<ul style="list-style-type: none">• Exam entries• Registrations/enrolment• Certificates• Invoices• Missing or late exam materials• Nominal roll reports• Results
Walled Garden	T: +44 (0)84 4543 0000 F: +44 (0)20 7294 2405 E: walledgarden@cityandguilds.com	<ul style="list-style-type: none">• Re-issue of password or username• Technical problems• Entries• Results• GOLLA• Navigation• User/menu option problems
Employer	T: +44 (0)121 503 8993 E: business_unit@cityandguilds.com	<ul style="list-style-type: none">• Employer solutions• Mapping• Accreditation• Development Skills• Consultancy

If you have a complaint, or any suggestions for improvement about any of the services that City & Guilds provides, email: feedbackandcomplaints@cityandguilds.com

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