22260VIC
Diploma of Applied Horticultural Science

Accredited for the period: 1 January 2014 to 31 December 2018 under Parts 4.4 and 4.6 of the *Education and Training Reform Act 2006.*

Version 1.1 – Amendments – units are updated to a later equivalent version, including core and elective units

Table of Contents

Section A: Copyright and course classification information

1. Copyright owner of the course	Copyright of this document is held by the Department of Education and Training, Victoria © State of Victoria 2017
2. Address	Executive Director Industry Engagement and VET Systems Higher Education and Skills Group Department of Education and Training (DET) GPO Box 4367 Melbourne Vic 3001 **Organisational Contact:** Manager Training Products Higher Education and Skills Group Telephone: (03) 9637 3092 Email: course.enquiry@edumail.vic.gov.au **Day to Day Contact** Primary Industries Curriculum Maintenance Manager (PICMM) Melbourne Polytechnic Yarra Bend Rd Fairfield, Victoria 3078 Email katebryce@melbournepolytechnic.edu.au
3. Type of submission	The course is submitted for reaccreditation. It replaces and has equivalent outcomes to: • 21788VIC Diploma of Ornamental Horticulture
4. Copyright acknowledgement	Copyright of this material is reserved to the Crown in the right of the State of Victoria. © State of Victoria (Department of Education and Training) 2017. Copyright of the following units of competency from nationally endorsed training packages is administered by the Commonwealth of Australia. © Commonwealth of Australia AHC Agriculture, Horticulture and Conservation and Land Management Training Package • AHCBUS501 Manage staff • AHCPCM501 Diagnose plant health problems • AHCPCM504 Design specialised landscape • AHCPGD501 Manage plant cultural practices • AHCWRK403 Supervise work routines and staff performance • AHCWRK503 Prepare reports • AHCWRK507 Implement professional practice BSB Business Services Training Package • BSBPMG522 Undertake project work
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www.education.vic.gov.au/training/providers/rto/Pages/courses.aspx</td></tr>
<tr><td>6. Course accrediting body</td><td>Victorian Registration and Qualifications Authority (VRQA)
Website : http://www.vrqa.vic.gov.au/</td></tr>
<tr><td>7.AVETMISS information</td><td>AVETMISS classification codes

<table><tr><td>ANZSCO [Australian and New Zealand Standard Classification of Occupations]</td><td>362211 Gardener (general)</td></tr><tr><td>ANZSIC code
(Australia and New Zealand Standard Industrial Classification – industry type)</td><td>9239 Recreational parks and gardens</td></tr><tr><td>ASCED Code – 4 digit
(Field of Education)</td><td>0503 Horticulture and Viticulture</td></tr><tr><td>National course code</td><td>22260VIC</td></tr></table></td></tr>
<tr><td>8. Period of accreditation</td><td>1 January 2014 to 31 December 2018</td></tr>
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Section B: Course Information

1. Nomenclature	Standard 1AQTF Standards for Accredited Courses
1.1 Name of the qualification	22260VIC Diploma of Applied Horticultural Science
1.2 Nominal duration of the course	1310-1400 hours
2. Vocational or educational outcomes Standard 1 AQTF Standards for Accredited Courses	
2.1 Purpose of the course	The Diploma of Applied Horticultural Science provides individuals with the high-level technical skills and knowledge required to work in horticultural enterprises. Enterprises in which participants may seek employment include: - local government - landscape enterprises - garden maintenance enterprises - botanic gardens and institutions.
3. Development of the course	**Standards 1 and 2 AQTF Standards for Accredited Courses**
3.1 Industry /enterprise/ community needs	Australia and Victoria, in particular, have a strong heritage in parks and gardens with significant historical, aesthetic and amenity values. The horticulture industry has identified the need to respond to the emerging challenges from a changing climate by creating, building and adapting horticultural practices. With an increased public awareness of the need to use resources more sustainably, changes in climatic conditions and the frequency of water restrictions in metropolitan and regional Victoria, horticulturalists have a responsibility to implement sustainable horticultural practices, where possible, and encourage the use of alternative plant species to develop resilient landscapes requiring less maintenance and consumption of water and other resources. The introduction of new methods in sustainable work practices and plant selection will allow horticulturalists to remain competitive and plan ahead to ensure the long term viability of the highly significant horticultural assets Australia is renowned for. The Diploma of Ornamental Horticulture was developed in 2004 as the result of a scoping report that identified the gaps in the RTF03 Amenity Horticulture Training Package. Examples of gaps include soil science relevant to horticulture outside of production and plant identification (in situ) units appropriate to horticulture. Despite identifying these gaps in industry consultation conducted as part of Training Package review and development, it is the view of industry that the AHC10 Agriculture, Horticulture and Conservation and Land Management Training Package still does not address the higher-level technical plant based competencieHihgs essential to the horticulture industry. These technical skills and knowledge relate to the need for horticulturalists to apply theoretical principles of botany, plant physiology, plant identification and soil science to

	horticultural practices, including practical skills in plant pruning and the care and maintenance of gardens. There has also been a strong reaction from industry in response to the steady decline in skills associated with 'plantsmanship' of horticulture employees. Although the Training Package makes general reference to these skills, it is not adequate to address the needs of industry. This is further supported by the Primary Industry Centre for Science Education which promotes the increasing importance of science to the horticulture sector in the areas of water security, sustainability and climate change. In 2012, Agri-Food Skills Australia noted labour shortages in horticulture. Anecdotal evidence from the steering committee confirms the difficulty in finding suitable candidates for job vacancies who have the requisite plant based skills. There are seven registered training organisations approved to deliver the superseded qualification. AVETMISS data provided by TAFE Institutes indicate that between 2008 and 2010, enrolments averaged between 40 to 50 students for 2011 – 75 enrolments, 2012 – 63 enrolments and 2013 – 24 enrolments for government funded places. Members of the steering committee were: Paul Grimes — Hume City Council - Chair Fred Hellriegel — University of Melbourne Tim Rowe — Wellington Shire Council John Arnott — Royal Botanic Gardens Cranbourne Shane Walden — Wyndham City Council Ian Barker — Ian Barker Landscapes and Landscapes Victoria Debra Nette — Provider representative, NMIT Keith Watmore — Past student The Project Manager was Kate Bryce, Primary Industries Curriculum Maintenance Manager, Northern Melbourne Institute of TAFE.
3.2 Review for re-accreditation	*Standards 1 and 2 for Accredited Courses* 22260VIC Diploma of Applied Horticultural Science is equivalent to and replaces 21788VIC Diploma of Ornamental Horticulture. As part of the ongoing course maintenance process, superseded units in 21788VIC were replaced with current units from AHC10 Agriculture, Horticulture and Conservation and Land Management Training Package. Additions were made to the range statements in *VBQU208 Work proficiently in the horticulture industry, VBQU211 Identify and select plants for a range of environments, VBQU212 Manage sustainable horticulture practices, VBQU216 Conserve and maintain heritage landscapes, VBQU217 Plan, establish and maintain lawns and lawn alternatives* and *VBP194 Prepare a garden design and maintenance program.* Minor rewording to two performance criteria were made in *VBQU209 Apply the science of botany to horticulture practices* and one statement under the heading Required Knowledge in *VBQU211*

	Identify and select plants for a range of environments was reworded. As part of the review for reaccreditation a skills profile was approved and undertaken by the steering committee, in order to review and validate the core skills required for employment in the industry. Surveys were distributed to industry representatives and results of the skills profile gave the steering committee direction in terms of which competencies should be included in the core. No new enrolments should be made into 21788VIC Diploma of Ornamental Horticulture after 31 December 2013. **Transition arrangements** Refer to the following table for the mapping of units in the superseded 21788VIC Diploma of Ornamental Horticulture against units in the current courses.

Units in superseded courses	**Units in current courses**	**Relationship**
VBQU208 Work proficiently in the horticulture industry	AHCWRK507 Implement professional practice	Not equivalent
VBQU209 Apply the science of botany to horticultural practices	VU21515 Apply the science of botany to horticultural practices	Equivalent
VBQU210 Apply plant physiology to horticultural practices	VU21516 Apply plant physiology to horticultural practices	Equivalent
VBQU211 Identify and select plants for a range of environments	VU21517 Identify and select plants to enhance sustainability	New unit
VBQU212 Manage sustainable horticultural practices	VU21518 Manage sustainable horticultural practices	Equivalent
AHCPCM501A Diagnose plant health problems	AHCPCM501 Diagnose plant health problems	Equivalent
AHCPGD501A Manage plant cultural practices	AHCPGD501Manage plant cultural practices	Equivalent
AHCSOL501A Monitor and manage soils for production	VU21519 Manage soils to enhance sustainability	Not equivalent
VBQU213 Develop and implement a pruning program	VU21520 Develop and implement a pruning program	Equivalent
VBQU214 Develop and implement a propagation program	VU21521 Develop and implement a propagation program	Equivalent
VBQU215 Manage the care and maintenance of trees	VU21522 Manage the care and maintenance of trees	Equivalent
VBQU216 Conserve and maintain heritage landscapes		Deleted
VBQU217 Plan, establish and maintain lawns and lawn alternatives	VU21523 Plan, establish and maintain lawns and lawn alternatives	Equivalent
AHCWRK403A Supervise work routines and staff performance	AHCWRK403 Supervise work routines and staff performance	Equivalent
AHCWRK503A Prepare reports	AHCWRK503 Prepare reports	Equivalent
VBN194 Prepare a garden design and maintenance program	AHCPCM504 Design specialised landscape	Not equivalent
	BSBPMG552 Undertake project work	New unit

Units in superseded courses	Units in current courses	Relationship
	VU21524 Select and use geographical information system technology (GIS)	New unit

4. Course outcomes	Standards 1, 2, 3 and 4 AQTF Standards for Accredited Courses
4.1 Qualification level	This course is consistent with the AQF level 5 as defined in the Australian Qualifications Framework. The Diploma qualifies individuals who apply integrated technical and theoretical concepts in a broad range of contexts to undertake advanced skilled or paraprofessional work and as a pathway for further learning. **Knowledge** Graduates of a Diploma will have technical and theoretical knowledge and concepts, with depth in some areas within a field of work and learning as in plant morphology and taxonomy. **Skills** Graduates of a Diploma will have: • cognitive and communication skills to identify, analyse, synthesise and act on information from a range of sources as in using GIS systems • cognitive, technical and communication skills to analyse, plan, design and evaluate approaches to unpredictable problems and/or management requirements as in developing design solutions. • specialist technical and creative skills to express ideas and perspectives as in compiling recommendations and documenting a design plan or report • communication skills to transfer knowledge and specialised skills to others and demonstrate understanding of knowledge. **Application of knowledge and skills** Graduates of a Diploma will demonstrate the application of knowledge and skills: • with depth in some areas of specialisation, in known or changing contexts as in designing and maintaining a specialised landscape • to transfer and apply theoretical concepts and/or technical and/or creative skills in a range of situations as in designing with plants appropriate for the use in controlled environments • with personal responsibility and autonomy in performing complex technical operations with responsibility for own outputs in relation to broad parameters for quantity and quality as in implementing biological, organic and inorganic plant and plant pest management techniques • with initiative and judgement to organise the work of self and others and plan, coordinate and evaluate the work of teams within broad but generally well defined parameters as in developing work plans to achieve organisational targets and business objectives. **Volume of learning**

	The volume of learning of a Diploma is typically 1 – 2 years. The Diploma of Applied Horticultural Science is consistent with the typical volume of learning for a qualification at this level. A significant number of additional hours of unsupervised learning are expected, including research activities, work experience and/or industry-based learning to support successful course completion.
4.2 Employability skills	*Standard 4 for Accredited Courses* **Diploma of Applied Horticultural Science** <u>Communication</u> • listening and understanding to clients • speaking clearly and directly to clients and work colleagues • reading and interpreting workplace related documentation on chemicals, fertilisers, • writing to audience needs when documenting information and preparing reports • interpreting the need of internal/external customers • applying numeracy skills to develop job and time based costings and pricings • establishing and using networks through local and international organisations • sharing information with colleagues • negotiating responsively with external clients <u>Teamwork</u> • working as an individual and a team member in carrying out work tasks • working with diverse individuals and client groups • applying knowledge of own role as a part of a team • applying teamwork skills to a range of situations • assessing and using staff capability against implementation and maintenance requirements <u>Problem solving</u> • developing practical and creative solutions to select plants for specific environments • showing interdependence and initiative in identifying plant health problems • solving problems individually or in teams to remedy plant health problems • applying a range of strategies in the identification of plants • using numeracy skills to solve problems • testing assumptions and taking context into account when modifying growing conditions <u>Initiative and enterprise</u> • adapting to new situations caused by climate change • being creative in response to workplace challenges by making allowances for contingencies • identifying opportunities that might not be obvious to others by comparing observations with expected results • generating a range of options in response to workplace matters • translating ideas into actions by promoting sustainable practices • developing a strategic, creative long-term vision for sustainable horticultural practices <u>Planning and organisation</u> • collecting, analysing and organising information on plant cultural requirements

	• using basic business systems for planning and organising • being appropriately resourceful by developing a professional practice plan • taking initiative and making decisions within workplace role • participating in continuous improvement and planning processes • working within or establishing clear project goals and deliverables • determining or applying required resources enhance sustainable horticultural practices • allocating people and other resources to tasks and workplace requirements maintenance tasks • managing time and priorities when allocating tasks and resources • adapting resource allocations to cope with contingencies <u>Self-management</u> • taking responsibility at the appropriate level • taking responsibility for quality of own work • evaluating and reflecting on own work performance <u>Learning</u> • defining own learning needs • carrying out independent learning to improve capability by undertaking research <u>Technology</u> • using technology and related workplace equipment • using technology to collect, organise and analyse data
4.3 Recognition given to the course (if applicable)	*Standard 5 for Accredited Courses* Not applicable
4.4 Licensing/ regulatory requirements (if applicable)	*Standard 5 for Accredited Courses* At the time of accreditation no licensing or regulatory requirements apply.
5. Course rules	**Standards 2, 6,7 and 9 AQTF Standards for Accredited**

5.1 Course structure

Standards 2, 6 and 7 for Accredited Courses

To be eligible for the award of 22260VIC Diploma of Applied Horticultural Science, learners must successfully complete a total of 15 units comprising:

- 10 core units
- 5 elective units

Elective units should support and enhance vocational, educational and/or personal development needs of learners.
Learners who do not successfully complete all the required units for either qualification will be issued with a Statement of Attainment for completed units.

Unit of competency code	Field of Education code (6-digit)	Unit of competency title	Pre-requisite	Nominal hours
Core units				
AHCWRK507		Implement professional practice		100
AHCWRK503		Prepare reports		60
VU21515	050301	Apply the science of botany to horticultural practices		60
VU21516	050301	Apply plant physiology to horticultural practices		60
VU21517	050301	Identify and select plants to enhance sustainability		100
VU21518	050301	Manage sustainable horticultural practices		70
AHCPCM501		Diagnose plant health problems		120
AHCPGD501		Manage plant cultural practices		200
VU21519	050301	Manage soils to enhance sustainability		100
AHCPCM504		Design and maintain a specialised landscape		150
		Sub-total		**1020**
Elective units - Select five elective units. Elective units may be selected from the list below or from units first packaged at an AQF level 4 or 5 in any other accredited course or endorsed training package qualification. Electives selected must be consistent with the vocational outcomes of this qualification.				
VU21520	050301	Develop and implement a pruning program		60
VU21521	050301	Develop and implement a propagation program		60
VU21522	050301	Manage the care and maintenance of trees		60
VU21523	050301	Plan, establish and maintain lawns and lawn alternatives		60
AHCWRK403		Supervise work routines and staff performance		50
BSBPMG522		Undertake project work		60

AHCBUS508		Prepare and monitor budgets and financial reports		140
VU21524	020399	Select, use and apply geographical information system technology (GIS)		60
			Nominal duration	**1310-1400**

5.2 Entry requirements	*Standard 9 for Accredited Courses* The following is a general guide to entry in relation to the language, literacy and numeracy skills of learners aligned to the Australian Core Skills Framework (ACSF), details of which can be accessed from: http://www.innovation.gov.au/skills/LiteracyAndNumeracy/AustralianCoreSkillsFramework/Pages/default.aspx Learners are best equipped to achieve the course outcomes in the Diploma of Applied Horticultural Science if they have minimum language, literacy and numeracy skills that are equivalent to Level 4 of the ACSF. • extracting key information from documents such laboratory results on soil analysis • developing a propagation strategy for plant production • reviewing and writing an evaluation of a pruning program Learners with language, literacy and numeracy skills at lower levels than those suggested will require additional support to successfully undertake the qualification.
6. Assessment	**Standards 10 and 12 AQTF Standards for Accredited Courses**
6.1 Assessment strategy	*Standard 10 for Accredited Courses* All assessment will be consistent with: Standard 1.2 of the *Australian Quality Training Framework Essential Conditions and Standards for Continuing (or Initial) Registration* See: AQTF User guides to the Essential Conditions and Standards for Continuing (or Initial) Registration: http://www.nssc.natese.gov.au/__data/assets/pdf_file/0003/69330/AQTF_Essential_Conditions_and_Standards_for_Initial_Registration_-_publication_July_2013.pdf http://www.nssc.natese.gov.au/__data/assets/pdf_file/0008/69344/AQTF_Essential_Conditions_and_Standards_for_Continuing_Registration_-_publication_July_2013.pdf Assessment methods should be flexible, valid, reliable and fair. Consistent with Standard 1, Element 5 of *the Australian Quality Training Framework Essential Conditions and Standards for Continuing (or Initial) Registration*, RTOs must ensure that Recognition of Prior Learning (RPL) is offered to all applicants in determining competency for Credit. Assessment of units requires evidence of satisfactory performance being sought for each element and its performance criteria and the

	required skills and knowledge through a variety of tasks depending on the criteria specified. The following principles should be used as a guide to the assessment approach: • assessment tasks/activities should be grounded in a relevant context and not be culturally biased • students should be assessed across a wide range of tasks integrated into practice, in order to increase reliability and validity of assessment. One-off assessment tasks do not provide a reliable and valid measure of competence • instructions for assessment tasks should be clear, explicit and ordered. Students must know what is expected and the criteria by which they will be judged • time allowed to complete a task should be reasonable and specified, and should allow for preparation and re-drafting as appropriate to the task • assessment should be validated. Moderation is likely to be a critical tool in validation. A range of validation strategies should be used, for example, mentoring, client satisfaction surveys, peer review and co-assessments • appropriate reference materials should be available to students during assessment, e.g. personal word lists, dictionaries, thesaurus, calculators. Assessment tools must meet the rules of evidence. To meet the rules, evidence must be: • valid, for example, address the elements and performance criteria, reflect the skills and knowledge described in the unit of competency, show application in the context described in the Range Statement • current, for example, demonstrate the candidate's current skills and knowledge • sufficient, for example, demonstrate competence over a period of time, demonstrate repeatable competence, not inflate the language, literacy and numeracy requirements beyond those required in performing the task and • authentic, for example: be the work of the learner, be corroborated / verified. A variety of assessment methods and evidence gathering techniques may be used with the overriding consideration being that the combined assessment must stress demonstrable performance by the student. Assessment tools must take into account the requirements of the unit in terms of skills, knowledge and performance. Assessment tools should also take into account the proposed destination of students. The Critical Aspects of Evidence section of each unit provides essential guidance on acceptable evidence. The evidence collected must relate to a number of performances assessed at different points in time, and, in a learning and assessment pathway, these must be separated by further learning and practice.

	Evidence requirements are specified in units in each qualification. Where appropriate, training providers are encouraged to take a holistic approach to assessment, by assessing more than one element concurrently, or combining the final assessment for more than one unit. When assessing units of competency from Training Packages, the evidence gathering and assessment must be carried out in accordance with the relevant Training Package guidelines. The assessment guidelines include the necessary qualifications for those conducting assessments and provide for situations where more than one person may contribute to the assessment and where the required technical and assessment competencies may not all be held by any one person.
6.2 Assessor competencies	Standard 12 for Accredited Courses The *Australian Quality Training Framework Essential Conditions and Standards for Continuing (or Initial) Registration,* Standard 1.4 states the requirements for the competence of persons assessing the course. See AQTF User Guides to the Essential Conditions and Standards for Continuing (or Initial) Registration: http://www.training.com.au/documents/AQTF Essential Conditions and Standards for Continuing Registration.pdf Assessors of the imported units of competency must meet the guidelines of the relevant Training Package and/or accredited course documentation. The Standards generally require that assessors: • have the training and assessment competencies as determined by the National Skills Standards Council (NSSC) or its successor, and • have the relevant vocational competencies at least to the level being delivered or assessed, and • can demonstrate current industry skills directly relevant to the training/assessment being undertaken and • continue to develop their VET knowledge and skills as well as their industry currency and trainer/assessor competence. Assessors should also have appropriate interpersonal and communication skills. Alternatively, a panel, team or partnership approach involving assessors and technical experts whereby the assessment is conducted by a team/panel/partnership in which at least one assessor has the competencies determined by the NSSC (or its successor) and the other assessor(s) have the relevant competencies, at least to the level being assessed.
7. Delivery	**Standards 11 and 12 AQTF Standards for Accredited Courses**
7.1 Delivery modes	*Standard 11 for Accredited Courses* All units of competency in the courses may be delivered in a variety of modes: classroom delivery, workplace projects, practical work, self-paced learning and case studies. Delivery options, including grouping of learners and learning activities, should recognise the varying learning needs,

	educational backgrounds, preferred learning styles and constraints of the individual learner and the specific requirements of each unit. Some areas of content may be common to more than one unit and therefore integration may be appropriate. Delivery strategies should actively involve the learner and learning should be experiential, relevant and age appropriate. This course is available for full or part-time study. Providers should be flexible in the way the training is delivered to ensure they meet the needs of the client group.
7.2 Resources	*Standard 12 for Accredited Courses* Resources include teachers/trainers who meet the *Australian Quality Training Framework Essential Conditions and Standards for Continuing (or Initial) Registration* Standard 1.4. See AQTF User Guides to the Essential Conditions and Standards for Continuing (or Initial) Registration: http://www.training.com.au/documents/AQTF Essential Conditions and Standards for Continuing Registration.pdf In general terms, to complete the Diploma of Applied Horticultural Science, access is required to a practising horticultural enterprise, which includes the range of resources appropriate to the sector. Access is also required to classrooms, library, horticultural references and computers with a range of relevant computer software. Access is required to current industry materials, technology, equipment, machinery and facilities as listed in the resource implications within each unit of competency.
8. Pathways and articulation	*Standard 8 for accredited courses* Imported units of competency give individuals automatic recognition for those units within a range of training packages. Individuals will receive credit for units in qualifications within the following Training Packages: • AHC Agriculture, Horticulture and Conservation and Land Management Training Package The course may enable individuals to enter further education with a horticulture focus. Examples of further training include: • AHC60216 Advanced Diploma of Horticulture • Associate Degree in Environmental Horticulture • Bachelor of Applied Science (Horticulture)
9. Ongoing monitoring and evaluation	*Standard 13 for accredited courses* Ongoing monitoring and evaluation of the course is the responsibility of the Primary Industries Curriculum Maintenance Manager (PICMM). PICMM will ensure that the content remains relevant and that teaching strategies are appropriate to the content. A formal review will take place once during the period of accreditation and will be informed by feedback from users of the curriculum and will consider at a minimum: • any changes required to meet emerging or developing needs • changes to any units of competency from nationally endorsed training packages or accredited curricula.

	Any significant changes to the courses will be notified to the VRQA.

Section C: Units of competency

Core units

AHCWRK507 Implement professional practice

AHCWRK503 Prepare reports

VU21515 Apply the science of botany to horticultural practices

VU21516 Apply plant physiology to horticultural practices

VU21517 Identify and select plants to enhance sustainability

VU21518 Manage sustainable horticultural practices

AHCPCM501 Diagnose plant health problems

AHCPGM501 Manage plant cultural practices

VU21519 Manage soils to enhance sustainability

AHCPCM504 Design and maintain a specialised landscape

Elective units

VU21520 Develop and implement a pruning program

VU21521 Develop and implement a propagation program

VU21522 Manage the care and maintenance of trees

VU21523 Plan, establish and maintain lawns and lawn alternatives

AHCWRK403 Supervise work routines and staff performance

BSBPMG522 Undertake project work

AHCBUS508 Prepare and monitor budgets and financial reports

VU21524 Select, use and apply geographical information system technology (GIS)

VU21515	Apply the science of botany to horticultural practices
Unit Descriptor	This unit applies the science of botany (plant morphology, plant taxonomy and plant terminology) to a wide range of horticultural practices including plant propagation, pruning, fertilising, irrigation, lawn establishment and maintenance, commercial growing of plants and crops, plant selection, tree management and maintenance, general management and maintenance of parks and gardens and the provision of specialist horticultural advice. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. Refer to the employability skills summary to identify employability skill requirements.
Application of the Unit	This unit is applicable to persons working in all sectors of the horticulture industry.

ELEMENT Elements describe the essential outcomes of a unit of competency.	**PERFORMANCE CRITERIA** Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold/italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Apply plant morphology to horticultural practices	1.1 Research, analyse and document specialist botanical knowledge of plant morphology including ***leaf characteristics***, ***surfaces***, ***shapes*** and ***margins*** and their ***attachments and arrangements***; ***stems*** and their ***characteristics***; ***flower structures***, ***shapes*** and ***inflorescences***, types of ***presentation and arrangements***; ***fruits*** and their structures from development to maturity and ***specialisations and modifications*** of plant structures for plant selection and maintenance purposes
	1.2 Select and maintain plants using specialist botanical knowledge of plant morphology
	1.3 Use correct botanical terminology when discussing plant morphology and identifying plants
2 Apply plant taxonomy to horticultural practices	2.1 Research specialist botanical knowledge of ***plant taxonomy*** including ***plant kingdom divisions***, ***major plant families*** and genera for plant culture purposes
	2.2 Use specialist botanical knowledge of plant taxonomy in plant culture

2.3 Use correct botanical terminology when discussing plant taxonomy

2.4 Apply the rules of ***plant nomenclature*** when naming plants

2.5 Identify a range of plants used in horticulture to species level, using ***plant keys*** and/or other references where required

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

- use appropriate authoritative references and resources for plant classification
- apply theoretical concepts of botany to horticultural practices
- identify plants according to accepted taxonomic classifications

Required Knowledge

- plant morphology
- plant taxonomy
- botanical terminology
- plant nomenclature according to the rules and recommendations of the International Code of Botanical Nomenclature (ICBN) and the International Code of Nomenclature for Cultivated Plants (ICNCP)
- a broad knowledge of horticultural practices

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Leaf characteristics may include:

- lamina
- margin
- base
- apex
- venation
- petiole

Leaf surfaces may include:

- glabrous
- glaucous
- hirsute
- hispid
- pubescent
- stellate hairs
- tomentose

Leaf shapes and margins may include:

Shapes of simple leaves

- ovate
- lanceolate
- elliptical

Compound leaves

- pinnate
- bipinnate
- palmate

Apices

- acute
- acuminate
- obtuse

Bases

- cordate
- oblique
- decurrent

Margins

- entire
- sinuate
- crenate
- dentate

Leaf attachments and arrangements may include:

- opposite
- alternate
- perfoliate
- whorled
- rosette
- distichous and decussate
- decurrent
- peltate

Stems and characteristics may include:

Stems:

- herbaceous
- woody
- modified eg. cladophylls, tubers, bulbs, corms, stolons and rhizomes

Characteristics

- apical buds
- axillary buds
- nodes and internodes

- bud and leaf scales
- lenticels
- bark

Flower structures may include:

- perfect
- imperfect
- complete
- incomplete
- receptacle
- ovary presentation
- whorls

Flower shapes may include:

- cruciform
- stellate
- campanulate
- tubular
- labiate
- actinomorphic
- zygomorphic

Flower inflorescences may include:

Racemose inflorescences

- spike
- head
- raceme
- corymb
- panicle

Cymose inflorescences

- compound monochasium
- compound dichasium
- cyme

Flower presentation and arrangements may include:

- terminal
- axillary
- pedicellate
- pedunculate

Fruits may include:

- simple
- dry dehiscent
- dry indehiscent
- fleshy
- compound
- aggregate

Specialisations and modifications may include:	• leaves • stems • roots • flowers
Plant taxonomy may include:	• The classification of plants into different categories, as cited in the ICBN and includes class, subclass, order, family, sub family, tribe, sub-tribe, genus, species, variety, form, cultivar and subspecies
Plant kingdom divisions may include:	• bryophytes • pterophytes • gymnosperms • angiosperms • monocotyledons • dicotyledons
Major plant families may include:	• Myrtaceae • Mimosaceae • Proteaceae • Rosaceae • Asteraceae • Orchidaceae • Poaceae • Fabaceae • Lamiaceae
Plant nomenclature may include:	• The formal method of naming plant species according to the rules and recommendations of the ICBN and ICNCP
Plants keys may include:	• Written and electronic tools for the classification and identification of plants utilising visible plant morphological characteristics. Accurate identification using plant keys can be limited by morphological limitations of the plant specimen and reliability of diagnostic features.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to assess competency in this unit	The learner must be able to: • demonstrate knowledge of the external structures of plants • use correct botanical terminology • apply the science of plant taxonomy to a range of plants

- classify a range of plants according to plant kingdom divisions and apply this to horticultural practices
- identify a range of plants using plant keys
- apply binomial nomenclature when naming plants

Evidence must include a wide range plants and assessment must include plants grown in situ.

Context of and specific resources for assessment

- The context for the assessment of this unit may be in a real or simulated workplace where horticultural practices would be undertaken.
- Specific resources required for the assessment of this unit include a real or simulated workplace environment, access to a wide range of plants growing in situ, microscopes, computers, taxonomic keys and botanical references and publications.

Method of assessment

The knowledge required in this unit underpins a wide range of horticultural skills and knowledge applicable to many areas of horticulture. Therefore this unit could be assessed in conjunction with one or more core or elective units.

Evidence should be gained through a range of methods to ensure valid and reliable assessment and consistency in performance. Evidence should be gathered as part of the learning process, where appropriate, and could be from an integrated assessment activity from another unit.

Assessment methods may include:

- assignment/s related to plant taxonomy
- practical demonstration to assess skills in using plant keys for plant identification
- oral and/or written questioning to assess understanding of botanical taxonomy
- portfolio of herbarium specimens
- third party report on the evidence gathered.

VU21516	Apply plant physiology to horticultural practices
Unit Descriptor	This unit covers the application of plant physiology to a wide range of horticultural practices including pruning, plant protection, the manipulation and management of growing environments, propagating and disbudding, growing of plants, tree management and maintenance, plant selection, and general management and maintenance of parks and gardens. It includes the ability to research and evaluate information and to transfer and apply theoretical concepts of plant physiology to a range of horticultural situations. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. Refer to the employability skills summary to identify employability skill requirements.
Application of the Unit	This unit is applicable to persons working in all sectors of the horticulture industry

ELEMENT Elements describe the essential outcomes of a unit of competency.	**PERFORMANCE CRITERIA** Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold/italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1.Identify plant structures, their functions and their impact on plant growth	1.1 Investigate and identify ***plant cell structures***, their functions and the organisation of cells into ***primary tissues***
	1.2 Research the functions of leaves, stems, root and flowers in relation to plant growth
	1.3 Describe the processes of photosynthesis, respiration and transpiration and explain their role in plant growth
2. Apply knowledge of ***plant functions*** to horticultural practices	2.1 Investigate the ***physical and environmental conditions*** and ***horticultural practices*** that may impact on ***plant function***
	2.2 Manipulate the physical and environmental conditions to achieve desired outcomes in horticultural practices
	2.3 Describe ***plant growth responses*** and the occurrence or addition of ***plant growth regulators*** and the ***implications*** for horticultural practices
	3.1 Use knowledge of ***asexual*** and ***sexual reproduction*** of plants in horticultural practices

3. Apply the processes of plant reproduction to horticultural practices	3.2 Research the methods of ***seed dispersal*** and apply this knowledge in horticultural practices
	3.3 Apply the processes of plant reproduction in the selection of plants and the management of weeds

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

- research and evaluate information
- explain the functions of internal and external plant structures
- apply the principles of plant growth responses and regulators to horticultural practices

Required Knowledge

- internal and external plant structures
- plant function, including diffusion, osmosis, photosynthesis, respiration, transpiration and translocation
- physical and environmental conditions and horticultural practices that may impact on plant function and how to manipulate them to achieve desired outcomes
- a broad knowledge of practices undertaken in horticulture, including plant selection and weed management
- the application of plant reproduction processes in horticultural practices
- the application of seed dispersal in horticulture

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Plant cell structures may include:	• cell wall • cell membrane • nucleus • vacuole • cytoplasm • mitochondrion • chloroplasts • other organelles
Primary tissues may include:	• meristem • xylem • phloem • cuticle • epidermis • cortex

- vascular cambium
- vascular rays
- stomata
- parenchyma
- sieve tubes

Physical and environmental conditions may include:

- drainage and irrigation systems
- paving
- walls
- buildings and other structures
- competing plants
- light (quantity, quality and duration)
- temperature range
- wind
- percentage of carbon dioxide and oxygen in the air
- availability of a range of mineral nutrients
- availability of water
- diseases
- airborne pollutants
- soil compaction

Horticultural practices may include:

- pruning techniques (eg crown reduction, thinning and root pruning)
- creation of artificial microclimates and growing environments
- use of soil ameliorants and mulches
- fertilizing and watering regimes
- location of plants in relation to light, moisture, air pollutants and competition with other plants

Plant function may refer to:

- plant cell structures
- primary tissues
- leaves
- stems
- roots and flowers
- photosynthesis
- respiration
- transpiration

Plant growth responses may include:

- phototropism
- geotropism
- hydrotropism
- thigmotropism

Naturally occurring and synthetic ***plant growth regulators*** may include:	• gibberellin • cytokinin • auxin • abscisic acid • ethylene gas
Implications for horticultural practices may include:	• promoting seed germination • siting of trees to increase shade • manipulation of growing environments to increase day length • propagating plants from cuttings • disbudding to promote better blooms from the remaining buds • controlling the shape of the plant and fruit maturation
Asexual reproduction may include:	• mitosis - a process of cell division where the chromosomes are duplicated and vegetative propagation - the propagation of plants from means other than seeds. • the application in horticulture may include the production of plants with the same genetic composition thorough stem, leaf and root cuttings, division, grafting and layering, the use of systemic herbicides in the control of perennial weeds and those with perennating underground organs
Sexual reproduction may include:	• the process of meiosis, pollination, fertilisation and embryo development. • sexual reproduction is applied to horticultural practices in plant propagation, breeding of new plant varieties, fruit development, and natural regeneration of plants and in flower and fruit production
The application of ***seed dispersal*** patterns to horticultural practices may include:	• plant propagation • breeding of new plant varieties • weed control • natural regeneration of plants • flower and fruit production

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to assess competency in this unit	The learner must be able to: • identify the principles of plant function and apply these to a range of horticultural practices • describe plant tropisms and growth hormones and the implication of these in horticultural practices

- identify and apply the processes of plant reproduction and seed dispersal to horticultural practices

Context of and specific resources for assessment

The context for the assessment of this unit may be in a real or simulated workplace where horticultural practices would be undertaken.

Specific resources required for the assessment of this unit include a real or simulated workplace environment, access to a wide range of plants growing in situ, microscopes, computers and botanical and biological references and publications

Method of assessment

The knowledge required in this unit underpins a wide range of horticultural skills and knowledge applicable to other areas of horticulture. Therefore this unit could be assessed in conjunction with one or more core or elective units.

Evidence should be gained through a range of methods to ensure valid and reliable assessment and consistency in performance.

Evidence should be gathered as part of the learning process, where appropriate, and could be from an integrated assessment activity from another unit.

Assessment methods may include:

- oral and/or written questioning to assess understanding of plant function
- assignment on the impact of environmental conditions on plant function
- report on the manipulation of physical and environmental factors to achieve optimum plant health
- practical demonstration of using growth hormones in plant propagation
- third party report on the evidence gathered

VU21517	Identify and select plants to enhance sustainability
Unit Descriptor	This unit describes the skills and knowledge to identify and select plants for sustainable horticultural situations. It requires knowledge of global climatic conditions and their effect on plant distribution and how plants adapt to their natural environment. Plant identification is pivotal to the ability to identify a plants potential to become a threat to environment, to the performance of a wide range of horticultural practices and the provision of specialist horticultural advice. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. Refer to the employability skills summary to identify employability skill requirements.
Application of the Unit	This unit is applicable to persons working in all sectors of the horticulture industry.

ELEMENT Elements describe the essential outcomes of a unit of competency.	**PERFORMANCE CRITERIA** Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold/italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.	
1 Research plants and their environment	1.1	Analyse the relationship between ***environmental factors*** and the distribution of plant communities for a range of plants used in horticulture
	1.2	Illustrate the impact of environmental factors on ***plant growth*** and determination of the natural growing season
	1.3	Describe ***plant adaptations*** in response to natural and manipulated environments in horticulture
	1.4	Research information on Australia's bioregions and describe how the different climate influences ***Australian vegetation communities***
	1.5	Document information for reference in plant selection for a range of horticultural sites
2 Identify plants used in horticulture	2.1	Source ***references*** for the identification of a range of plants

	2.2	Identify and describe a range of plants to species level, using plant keys where required
	2.3	Research and ***document*** information on the identified plants using correct botanical names and terminology
3 Select plants for sustainable horticultural practices	3.1	Evaluate the ***criteria for plant selection*** and research and document information on ***plants*** suitable for a range of horticultural sites.
	3.2	Research and comply with ***legislation*** applicable to horticulture when selecting plants.
	3.3	Research and document information on plants that may present a ***threat to the environment***

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

- use appropriate authoritative references and resources for plant identification
- apply theoretical concepts of botany in the identification of plants
- identify plants according to accepted taxonomic classifications, using correct botanical names
- evaluate the physical and environmental factors of a particular microclimate
- evaluate the factors for plant selection for a particular microclimate
- select plants to meet particular criteria for a range of horticultural situations

Required Knowledge

- the principles of plant form and structure (morphology)
- the principles of plant classification (taxonomy)
- plant nomenclature according to the rules and recommendations of the International Code of Botanical Nomenclature (ICBN) and the International Code of Nomenclature for Cultivated Plants (ICNCP).
- botanical terminology
- principles of sustainability

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Environmental factors may include:	• arid climates • cold climates • flooding • fire • salinity

- altitude
- topography
- coastal environment
- low or high rainfall
- frost
- nutrient deficient soils
- plant competition.

Plant growth may be affected by:

- nutrient uptake
- ability to photosynthesise
- ability respire and transpire
- seed germination
- flower and fruit development
- seed dispersal
- adequate light
- soil moisture
- humidity
- correct temperature

Plant adaptations may include:

- sunken stomata
- leaf hairs
- adapted life cycles
- climbing habit
- leaf drop
- storage organs
- lignotubers
- pneumatophores
- epicormic growth
- leaf shape
- size
- presentation
- arrangement

Australian vegetation communities may include:

- tropical and cool temperate rainforest
- wet and dry sclerophyll forests and woodlands
- open and closed forests and woodlands
- shrublands
- grasslands
- mangroves

References may include:	• plant keys • herbarium collections • botanical and horticultural reference books • photographic and digital images • websites • published books and journals (e.g. Floras) • experts in the local area or industry sector.
Practices and/or resources for plant identification may include:	• observation of the plant in situ • the collection of a range of fresh plant specimens • collecting, preserving and labelling plant specimens for a herbarium • the use of photographs • digital images • botanical and horticultural websites • reference books
Documentation in written or electronic formats may include:	• report • portfolio • plant culture sheets • catalogue or database
Criteria for plant selection may include:	• lifecycle • form • size • habit • flower and fruit attributes • scent • colour • texture • climatic and microclimatic factors • water requirements • historic period • specific requirements • use and function over time • specific theme • commercial horticultural production
Plants may include:	• Trees • Shrubs • Groundcovers • Annuals

	• Biennials • Perennials • herbaceous perennials • evergreen plants • deciduous plants • climbers • aquatic plants • alpine plants • ferns • mosses • conifers • cycads
Legislation may include:	• Catchment and Land Protection Act which covers State Prohibited, Regionally Controlled, Regionally Prohibited, and Restricted Weeds • Local Government Acts under which councils enable local bylaws targeting specific weeds • Fisheries Act which covers the use of aquatic plants • Environment Protection and Biodiversity Conservation Act which covers the importation of live plants and actions that impact on threatened species • Australian Quarantine and Inspection Service (AQIS) legislation • environmental overlays
Threat to the environment may come from:	• Any plants included in State and Commonwealth legislation relating to weeds • plants with the potential to out-compete other plants for moisture, nutrients and light • plants containing toxic compounds and allergens that are poisonous to animals and humans • plants that harbour diseases and vermin
Sustainable horticulture practices may include:	• protection of soil from wind and water erosion • providing habitat for interdependent plants and animals • carbon sequestration • selecting plants suited to the microclimate that require minimal water and maintenance

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to assess competency in this unit	The learner must be able to: • Determine the effects of climatic and environmental conditions on plant growth and distribution • Explain the impacts of climatic conditions on plants and horticultural practices • Explain how plants adapt to their natural environments • Identify a range of plants using plant keys, if required • Apply binomial nomenclature when naming plants • Research and document information on a range of plants and their suitability for sustainable horticultural situations • Select plants according to specific criteria and for a range of horticultural situations. • Evidence must include the identification and selection of a wide range plants, in variety of different horticultural situations and must include plants grown in situ. The assessment must include a minimum of 500 plant identifications.
Context of and specific resources for assessment	The context for the assessment of this unit may be in a real or simulated workplace where horticultural practices would be undertaken. Specific resources required for the assessment of this unit include a real or simulated workplace environment, access to a range of sites where plant identification and selection would be required, classroom and computer access, horticultural references and publications.
Method of assessment	The knowledge required in this unit underpins a wide range of horticultural skills and knowledge applicable to other areas of horticulture. Therefore this unit could be assessed in conjunction with one or more units. Evidence should be gained through a range of methods to ensure valid and reliable assessment and consistency in performance. Evidence should be gathered as part of the learning process, where appropriate, and could be from an integrated assessment activity from another unit. • assessment methods may include: • assignment on plant adaptations to their environment • practical demonstration to assess skills in plant identification • oral and/or written questioning to assess understanding of the effects of climatic conditions on plant growth • portfolio of plant cultural information • report on recommendations for plants for a particular site • third party report on the evidence gathered.

VU21518	Manage sustainable horticultural practices
Unit Descriptor	This unit covers the skills and knowledge required to manage sustainable horticultural practices. It includes the ability to identify and use sustainable principles and research and evaluate resources and materials to make recommendations to initiate and/or improve sustainable practices. It requires the knowledge of the legislation that applies to sustainability, and procedures for undertaking a sustainability audit. Work is likely to be undertaken with limited supervision and may involve planning and monitoring the work of others. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. Refer to the employability skills summary to identify employability skill requirements.
Application of the Unit	This unit is applicable to persons working in all sectors of the horticulture industry.

ELEMENT Elements describe the essential outcomes of a unit of competency.	**PERFORMANCE CRITERIA** Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold/italicised teXt is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Determine the principles of sustainability in horticulture	1.1 Examine the ***environmental and ecological implications*** in relation to sustainable horticultural practices 1.2 Evaluate the ***economic*** considerations in relation to sustainable horticultural practices 1.3 Analyse the influences and impacts of ***societal values*** in relation to a horticultural enterprise 1.4 Investigate the ***legislation, standards, policies and procedures*** that apply to sustainable principles
2 Apply the principles of sustainability to the use of energy resources and materials	2.1 Identify strategies to minimise the use of ***energy resources and materials*** 2.2 Locate energy resources originating from ***renewable or alternative sources*** and evaluate materials in relation to their ***sustainability***

	2.3	Minimise the use of energy through the introduction of ***efficient and passive systems***
	2.4	Make ***recommendations*** to improve the efficiency of energy and material use
3 Apply the principles of sustainability to the use of water	3.1	Source water from locations other than mains water and from ***sustainable sources***, where possible
	3.2	Develop ***strategies*** to minimise water use, including the prevention of evaporation and ***runoff***
	3.3	Develop planting strategies suitable for client requirements, existing soil type and microclimates, in accordance with sustainable watering strategies
4 Undertake a sustainability audit	4.1	Research ***procedures*** used in undertaking a sustainability audit
	4.2	Undertake a sustainability audit on horticultural work practices
	4.3	Analyse audit results and recommend ***modifications*** to horticultural work practices to improve sustainability
	4.4	Communicate recommendations to work personnel to implement improved work practices

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

- examine and evaluate sustainable principles in relation to horticulture
- identify renewable or alternative sources of energy
- select efficient and passive systems to minimise the use and waste of energy resources and materials
- research materials used in horticulture and evaluate them in relation to sustainability
- undertake a sustainability audit and analyse results
- recommend improvements to sustainability practices in horticulture

Required Knowledge

- principles of sustainability and their application in horticulture
- the sustainable use of energy resources and materials
- efficient water systems and sustainable sources of water
- environmental weed assessment and management
- the process of evaluating materials in relation to their sustainability
- the life-cycle analysis characteristics of materials and their embodied energy use
- procedures used in undertaking a sustainability audit

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Environmental and ecological implications may include:	• consumption of natural resources • impact of human actions on the environment • energy and water strategies • effective protection of the environment • the life-cycle performance of materials • atmospheric pollution • the generation and management of waste • enhancement of natural systems • consideration of microclimates and natural energy flows • management of environmental weeds • the provision of habitat and wildlife corridors and benefits to plants, animals and humans • impact on groundwater
Economic considerations may include:	• budget parameters • developing cost effective practices • durability of plants and materials • long-term maintenance requirements • on going costs
Societal values may include:	• business ethics • fair trading • human and animal rights • the human relationship with nature • cultural values • the involvement of local community and professionals from different sectors • considered use of natural resources and responsibilities in meeting current needs without compromising future generations
Legislation, standards, policies and procedures may include:	• State Environment Protection Policies • Commonwealth, State and Local Government Acts • Regulations and Codes of Practice • Environmental Management Systems • ISO 14000 Standards from International Organization for Standardisation • UN Local Agenda 21 - the Rio Declaration on Environment and Development • Ecological Footprint Analysis • Natural Capitalism

Energy resources and materials may include:	Energy resources: • electricity • gas • water • fuel Materials • soil • rocks • mulches • timber for construction • timber products • sand • gravel and pebbles • plants • paper • plastics and chemicals
Renewable or alternative sources may include:	• sourcing electricity from a company using solar, hydro and wind power • installing solar powered lighting and energy efficient light globes • using hybrid cars or those using alternative fuel
Sustainability may include the use of materials that:	• are locally produced or available on-site • require minimal processing • remanufactured, reusable or recycled • do not contain or emit toxic substances • are biodegradable • have a minimal impact on the environment from where they are sourced (e.g. timber from renewable plantations) • have a high life-cycle performance (the life-cycle analysis characteristics of a material including composition, toxicity, durability and potential for environmental impact, reuse or recycling) • have a low embodied energy use (the energy used to extract, manufacture, transport, apply and dispose of a material or product) • have a porous quality allowing for water penetration
Efficient and passive systems may include:	• low energy lighting • irrigation systems that minimise water use • orientation of landscape features for sun/shade

	• sustainable planting strategies, designing for low maintenance requirements • regular machinery maintenance to minimise emissions and discharges
Recommendations may include:	• Ecologically Sustainable Development (ESD) Building Principles • buying products that meet the Minimum Energy Performance Standards (MEPS) • reusing/recycling paper • buying materials obtained in amounts that minimise packaging and waste • planting trees to maximise light and shade requirements • using ground covers or mulches to prevent soil erosion and water evaporation • installing water efficient fixtures and appliances • minimising the need for additional watering above given rainfall
Sustainable sources may include:	• grey water systems • collecting rainwater and roof runoff • recycled water
Strategies may include:	• use of efficient watering systems • misting sprays and capillary matting irrigation in nurseries • use of organic matter and mulch • coring and scarifying turf to allow deeper water penetration • planting warm-season grasses • training staff in effective water management • application of wetting agents • use of soil moisture sensors • regular maintenance of irrigation systems • using plants with low water requirements
Runoff may be from:	• irrigation systems • rain • stormwater • inefficient or defective drains • cooling systems
Procedures may include:	• calculating ecological footprints • cost benefit analyses • Environmental Performance Evaluation (EPE) • evaluating the impact on society and the environment

- analysing the life-cycle performance of materials and embodied energy use
- evaluating the use of energy resources and materials
- identifying actions taken to minimise the impact of activities on the environment
- identifying mechanisms for reviewing and increasing the effectiveness of actions taken

Modifications may include:

- introduction of new/improved sustainable products and materials
- reviewing the use of water and energy resources
- amending working practices to improve sustainability
- updating policies and procedures and complying with new legislation
- networking with local community and other professionals in implementing collective sustainable practices

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to assess competency in this unit

The learner must be able to:

- identify and evaluate the principles of sustainability and their application in horticulture
- apply the principles of sustainability to the use of water and energy resources with renewable or alternative sources and evaluating resource use and waste
- evaluate the sustainability of materials in relation to their life-cycle performance and embodied energy use
- undertake a sustainability audit in a horticultural enterprise
- analyse audit results and recommend strategies for improving sustainability
- communicate recommendations to others

Context of and specific resources for assessment

For valid assessment, the candidate must have an opportunity to undertake a range of exercises and practical assessments that demonstrate the skills and knowledge required in this competency. The context for the assessment of this unit may be in a real or simulated workplace applicable to horticulture.

Specific resources required for assessment of this unit include a real or simulated horticultural work environment, a computer lab and internet access, copies of legislation, standards and policies that apply to sustainability, and access to information on:

- principles of sustainability
- sources of renewable or alternative energy resources
- materials used in horticulture, in particular renewable, reusable and recyclable materials

- methods of undertaking sustainability audits

Method of assessment

Evidence should be gained through a range of methods to ensure valid and reliable assessment and consistence in performance.

Evidence should be gathered as part of the learning process where appropriate and could be from assessment of the unit of competency alone, through an integrated assessment activity or through a combination of both.

Assessment methods could include:

- oral and/or written questioning to assess knowledge of legislation, standards, procedures and policies that apply to sustainable principles
- assignment on the analysis of resources and materials
- a project of a sustainability audit for a horticultural enterprise
- report recommending improvements in horticultural practices following a sustainability audit
- third party reports supporting the evidence gathered

VU21519	Manage soils to enhance sustainability
Unit Descriptor	This unit covers the skills and knowledge required to identify and assess soils and growing media characteristics. It requires knowledge of the impact of environmental conditions and horticultural practices on soil/media health. It includes the ability to identify, implement and review sustainable practices to promote healthy soil/soil less media. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. Refer to the employability skills summary to identify employability skill requirements.
Application of the Unit	This unit is applicable to persons working in all sectors of the horticulture industry.

ELEMENT Elements describe the essential outcomes of a unit of competency.	**PERFORMANCE CRITERIA** Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold/italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.	
1 Identify characteristics of Australian soils	1.1	Identify the ***common characteristics*** of Australian soils and their limitations
	1.2	Refer to a site assessment to establish ***soil characteristics***
	1.3	Research ***soil biota*** and its relationship to soil fertility
	1.4	Evaluate current horticultural practices in terms of their possible contribution to ***land degradation and soil problems***
	1.5	Identify and select appropriate soil preparation methods to maintain and improve soil structure and fertility
2 Develop a plan to improve and maintain the health of soils and/or growing media	2.1	Identify the impact of weather and climate on operational activities on soil/media structure and fertility and develop contingency plans to account for climatic or other events.
	2.2	Interpret ***soil/media test analysis*** and compare with historical data in the development of a plan
	2.3	Select required nutrient balance levels to improve fertility for effective use and uptake of plants
	2.4	Evaluate alternative strategies or products to improve soil/media fertility

	2.5	Develop a soil/media amendment strategy including ***soil/media ameliorating activities*** and ***soil/media ameliorant products*** to enhance sustainability of soil/media health
	2.6	Determine soil conservation strategies to minimise soil erosion
	2.7	Assess the ***environmental implications of chemical use***, consider and document alternative methods
	2.8	Develop a plan to improve, monitor and record the health of soils/media
3 Implement plan for improvement and maintenance of healthy soil/media	3.1	Implement the plan schedule for soil/media improvement taking into account ***seasonal, geographical and resource factors***
	3.2	Implement strategies to integrate the most suitable methods of soil/media improvement operations with the proposed land use
	3.3	Determine key staff responsibilities for specific implementation processes and allocate duties
	3.4	Modify plan to meet all contingencies and communicate with appropriate staff
	3.5	Record soil/media management activities and file in the appropriate manner
4 Review plan, implementation strategy and the outcomes and determine necessary modifications	4.1	Analyse effectiveness of the soil/media improvement management plan, through ***evaluation*** at key points, making adjustments as necessary
	4.2	Prepare recommendations for future strategies, based on the analysis of site observations and data to further enhance soil/media ecosystem

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

- research information on soils and different growing media
- assess soil type, texture and structure in a site
- diagnose areas with soil problems or potential soil problems
- diagnose and interpret soil/media sample test results and determine priorities for improving soil/media health
- consider and select alternatives including organic products and methods for improving soil/media health
- calculate amounts of nutrients required and prepare a fertiliser program which reflects needs and priorities
- record and store information

- develop, implement and evaluate a plan to achieve healthy soils/media through application of soil science
- monitor soil/media health from the application of soil science

Required Knowledge

- physical, chemical and biological properties of soils/media
- soil biota - types, role in cycling nutrients and improving soil structure
- basic chemistry concepts related to interpreting soil test analysis: symbols, elements and compounds; valency, anions, cations; reactions; EC (electrical conductivity), CEC (Cation Exchange Capacity); organic matter; pH and its importance in the availability of nutrients; role of macronutrients and micronutrients in plant nutrition
- basic biology: the chemical basis of plants and animals; basic plant structure and function; plant nutrition; water, proteins, sugar, nitrate, lignin content; extent and nature of soil micro organisms
- the natural cycling of nutrients: carbon, nitrogen, phosphorous and the role of soil biota in the cycles
- factors affecting soil biota: moisture, temperature, aeration, nutrient supply, pH, and organic matter
- possibility of problems with the use of conventional chemical fertilisers including acidification contamination of soil and associated water contamination and harm to soil biota
- alternative methods to improve soil fertility, including products and use of machinery for aeration and mulching
- appropriate timing for fertiliser applications
- strategies to reduce herbicide use and to reduce and recycle waste.
- soil conservation strategies and sustainable techniques
- underground water movement
- data collection and record keeping

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Common characteristics may include:	• low fertility levels • low organic matter • low cation exchange capacity • shallow depth of topsoil
Soil characteristics may include:	• soil consistency, structure (including slaking and dispersion) and texture • topsoil depth • soil smell • presence of carbonates • soil compaction • depth of root growth, root health and colour

	• water holding capacity and water infiltration • living organism diversity • earthworm numbers- as a general indicator of soil health • degree of dispersability of soil • sodicity
The effect of ***soil biota*** on soil fertility:	• Good soil biota population is the basis for sustainable soil fertility. It consists of a very diverse range of microorganisms, including bacteria, fungi, nematodes, protozoa and arthropods. Some organisms are pathogenic, some are beneficial. • These macro and micro-organisms decompose organic matter and cycle nutrients, making them available to the plants; they enhance soil structure, control populations of soil organisms, including pests, and break down toxic substances
Land degradation and soil problems may include:	• dry-land and irrigation salinity • salinity • wind and water erosion • bare areas • poor plant growth • weeds • soil compaction • water-logging and poor water quality. • nutrient deficiencies • pesticides and herbicides • acidification • excessive nutrients
Soil/media test analysis may include:	• soil pH • cation exchange capacity and the balance of cations • toxicity levels eg aluminium, sodium • carbon content/organic matter • approximate nutrient levels in soil/media • suggested optimum levels of nutrients • trace elements
Alternative strategies may include:	• use of green manure crops; increasing calcium levels; adding organic matter and aeration of soils to improve soil biota activity and utilising nutrients that are locked up • organic matter may include mulched sites/plant tissue, organic nutrients, crop residues, worm castings, composted paper and cardboard, grass clippings, sawdust and seaweed

	• use of parasitic controls and strategic use of herbicides to minimise frequency of use and concentration • use of biological controls
Soil/media ameliorating activities may include:	• alleviating soil compaction by using aerator and balancing the calcium/magnesium ratio • modifications to soil drainage or moisture holding capacity • practices that increase levels of organic matter
Soil/media ameliorant products may include:	• pH modifying agents such as lime • structure modifying agents such as gypsum and artificial structure additives • organic matter • animal organic products • flocculating agents • texture modifications • wetting and water retention agents
Environmental implications of chemical use may include:	• mass movement of phosphates, nitrates • effect on groundwater levels and quality • fertiliser and nitrates run-off causing algal blooms • herbicide and pesticide effects on living biology of soil, human and animal populations • run off
Seasonal, geographical and resource factors may include:	• forecast of heavy rain events when application of fertiliser is scheduled • lack of rain in growing season • summer rainfall where weed germination may occur • flood • frost • long term drought conditions • use of contractors to complete operations in a timely manner • staffing
Evaluation may include:	• improvement in soil fertility - measured by comparison of soil tests • increase in biodiversity of the soil • improved water quality from reduced fertiliser and chemical run-off • efficient resource use

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to assess competency in this unit	The learner must be able to: • critically analyse current soil status and identify essential elements of healthy soils/growing media • develop a plan to improve and maintain a healthy soil/media • implement plan to improve and sustain a healthy soil/media • review the plan in terms of the intended outcomes of achieving healthy soils/media and make modifications. Evidence must include a wide range plants and assessment must include plants grown in situ.
Context of and specific resources for assessment	The context for the assessment of this unit may be in a real or simulated workplace where horticultural practices would be undertaken. Specific resources required include: • access to a wide range of plants growing in situ • soil/media test laboratory results • soil biota laboratory results • records of soil/media tests
Method of assessment	For valid and reliable assessment of this unit, evidence should be gathered from a range of methods to provide consistent performance. This unit can be assessed as a stand-alone unit of competency, integrated assessment tasks with another unit of competency or through a combination of both. Evidence should be gathered as part of the learning process where appropriate. The following assessment methods are suggested: • practical exercises, for example assessing the current status of the soil and/ media health and structure • written and/or oral questioning to assess knowledge and understanding of soil and media physical properties, soil chemistry, diagnosing and interpreting soil test results and plant nutrition through soil management • completion of learning materials, including analysis of sites and circumstances, case studies and management plans • development of a product or plan to improve the health and fertility of soil/media • third party report to support the evidence gathered • consideration of case studies which may be from different geographical areas and rainfall zones to assess learners ability to transfer skills and knowledge and problem solving abilities.

VU21520 Develop and implement a pruning program

Unit Descriptor	This unit of competency covers the development and implementation of a pruning program, evaluating the results and recommending improvements. It requires the knowledge of basic plant physiology and anatomy, principles and techniques of specialist pruning and pruning tools and equipment. It includes the application of particular pruning techniques, monitoring of the pruning program and undertaking risk management strategies, when required. Pruning activities should be undertaken at a height limit of no more than two metres. This unit does not cover aerial pruning from ladders, elevated work platforms or from climbing ropes and rigging in a tree. Specialists should be consulted when required. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. Refer to the employability skills summary to identify employability skill requirements.
Application of the Unit	This unit is applicable to persons working in all sectors of the horticulture industry.

ELEMENT Elements describe the essential outcomes of a unit of competency.	**PERFORMANCE CRITERIA** Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold/italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Develop a pruning program	1.1 Identify target species and determine ***pruning requirements*** according to the ***plant characteristics*** and desired outcomes. 1.2 Establish the appropriate pruning strategies for ***specialist plants***, consulting ***references***, when required. 1.3 Identify ***OHS hazards,*** assess risks and establish suitable controls, according to workplace policies and procedures. 1.4 Select the ***pruning tools and equipment*** according to the requirements of the program. 1.5 Recognise ***the limits of own expertise*** and utilise the ***providers of specialised services*** as required. 1.6 Document the pruning program, including costs and scheduled priorities to meet timelines and accommodate staffing resources. 1.7 Communicate individual roles and responsibilities to work personnel.

2 Implement and monitor the pruning program	2.1	Determine requirements for access for staff and equipment; install signage and safety barriers and ensure site is clear of obstacles that may impede safe working conditions.
	2.2	Select and use tools, equipment and machinery according to OHS requirements and manufacturers specifications and following hygiene protocols.
	2.3	Apply ***pruning techniques*** according to the pruning program and within limits of own expertise.
	2.4	Monitor and document pruning techniques as specified in the program, and undertake ***risk management strategies*** if required.
	2.5	Clear and clean site, dispose of waste material, clean and store tools, equipment and machinery following hygiene protocols.
3 Evaluate the pruning program	3.1	Visually check plants to ensure pruning requirements have been met.
	3.2	Evaluate the results of pruning against the planned program.
	3.3	Recommend and record improvements to the effectiveness and efficiency of the program.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

- Identify a comprehensive range of plant species and their pruning requirements
- Recognise the need for pruning, including remedial or corrective pruning
- Use, maintain and store tools required for pruning following hygiene protocols
- Use appropriate pruning techniques
- Communicate with work personnel
- Recognise when the services of specialist technical expertise is required

Required Knowledge

- basic plant physiology and morphology
- the effect of pruning on a range of plants
- OHS hazards and risk assessment associated with pruning
- principles and methods of pruning to achieve given objectives
- hygiene protocols before, during and after pruning
- specialist pruning tools, equipment and machinery
- plant annual growth cycles and the correct timing for pruning

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Pruning requirements may include:	Size, light, shape, aesthetics, competition, density, structures, manipulation of form, modification of flowering or fruiting behaviour and removal of diseased, broken or damaged material.
Plant characteristics may include:	Growth patterns, type of foliage, timing of flowering and fruiting, responses to pruning, habit and form.
Specialist plants may include:	Fruit trees and vines, ornamental flowering trees and shrubs, heritage listed plants, standards, topiaries, arbors, roses, plants grown for fruit production, and other plants that have special pruning requirements due to flowering, growth or other characteristics.
References consulted may include:	*Australian Standards for Pruning of Amenity Trees AS4373*, significant tree registers and/or legislation, specific tree preservation orders, council by-laws, specialist texts, horticultural fact sheets and grower notes, Internet sites and consultants.
OHS hazards likely to be associated with pruning may include:	Solar radiation, dust, noise, falling limbs, sharp/blunt pruning tools and equipment, toxic and injurious plant material, muscle strain injuries and uneven ground.
Pruning tools and equipment that may be used include:	Secateurs, pruners, handsaws, hedge trimmers, steps, chippers and mulchers.
The ***limits of own expertise*** may include***:***	The point at which the scope and/or complexity of a given job necessitates the outsourcing of particular components of a pruning program to a practitioner who is more expert in that field.
Providers of specialised services may include:	Arborists or heritage tree experts.
Pruning technique likely to be undertaken may include:	Dead wooding, hedging, branch and root pruning, canopy regeneration, promotion of flower and fruit production, formative pruning, biomass reduction, epicormic and green shoot removal.
Risk management strategies may include:	Allowing for unforeseen changes to the pruning program, which could be due to staffing availability, OHS hazards, changes to priorities, the outbreak of plant diseases and damage caused by extraneous circumstances.

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to assess competency in this unit

The learner must be able to:

- Recognise the need for pruning and select the appropriate pruning technique according to the plant characteristics
- Identify OHS hazards and implement suitable control methods
- Undertake a range of different pruning techniques to achieve the given objectives
- Use a range of pruning tools, equipment and machinery
- Recognise limits of own expertise in pruning and source and apply technical/specialist services when required
- Plan, implement and evaluate results of pruning and make recommendations for improvements to the program.

Context of and specific resources for assessment

For valid assessment, the candidate must have an opportunity to undertake a range of exercises and practical assessments that demonstrate the skills and knowledge required in this competency. The context for the assessment of this unit may be in a real or simulated workplace where pruning would be undertaken.

Specific resources required for the assessment of this unit include a real or simulated workplace environment, access to a range of plants, access to pruning tools and equipment, computers and industry references and publications

Method of assessment

Evidence should be gained through a range of methods to ensure valid and reliable assessment and consistency in performance.

Evidence should be gathered as part of the learning process, where appropriate, and could be from assessment of the unit alone, through an integrated assessment activity or a combination of both.

- Assessment methods may include:
    - oral and/or written questioning to determine understanding of specialised pruning techniques
    - assignment in developing a documented pruning program
    - practical demonstration of pruning techniques
    - work diary detailing pruning activities
    - third party report of evidence gathered.

VU21521	Develop and implement a propagation program
Unit Descriptor	This unit covers the processes of plant propagation. It requires the application of a broad range of knowledge including ethics and legislation pertaining to plant material collection; propagation techniques and treatments, growing media and resources required for propagation and hygiene protocols. It requires the ability to research information, collect and propagate plant material, develop a propagation program and make recommendations for improvements. The work is likely to be carried out without supervision, and planning and monitoring the work of others may be required. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. Refer to the employability skills summary to identify employability skill requirements.
Application of the Unit	This unit is applicable to persons working in all sectors of the horticulture industry.

ELEMENT Elements describe the essential outcomes of a unit of competency.	**PERFORMANCE CRITERIA** Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold/italicised test is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan a propagation program	1.1 Identify the ***requirements*** for the program, including Plant Breeders Rights and other legislation. 1.2 Select the ***propagation techniques*** and timing appropriate for the plant species and devise strategies for modifying the growing environment according to ***environmental parameters***. 1.3 Identify and assess ***OHS hazards*** and plan suitable controls. 1.4 Identify the ***propagation media characteristics*** according to the propagation technique and needs of the plant species. 1.5 Coordinate ***resources*** required for the implementation of the program.
2 Implement propagation program	2.1 Comply with legislation and regulations with regard to ***quarantine regulations*** where necessary. 2.2 Observe ***collecting ethics*** when selecting specimens and collecting plant material. 2.3 Collect propagation material and apply suitable ***conditioning and storage requirements***.

	2.4	Propagate plant material, using correct ***preparation treatments,*** according to the propagation program.
	2.5	Complete propagation activities ensuring work site is cleaned and ***waste*** is collected and disposed of, or recycled.
	2.6	Apply ***after care treatments*** to suit media conditions, plant requirements and propagation techniques employed.
	2.7	Complete documentation of propagation activities and record any ***cultural intervention procedures*** required during growing on period.
3 Review the propagation program	3.1	Assess propagated plants for health, quality and viability according to marketing requirements and quality specifications and site requirements.
	3.2	Review propagation program and recommend and document strategies for potential improvements.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

- research information from a range of sources including horticultural literature, internet and propagation plans
- identify and assess OHS hazards and implement controls
- select healthy parent plants, propagation materials, media, equipment and materials according to hygiene standards
- collect and store plant material
- propagate plants using a variety of techniques
- perform after care requirements for a range of plants
- modify a growing environment in response to needs of propagated material
- analyse basic data to review performance and success of propagation program
- communicate details of program to others.

Required Knowledge

- quality specifications for parent plants and propagation material
- hygiene practices required for propagation operations
- a range of propagation techniques
- appropriate timing for propagation for a range of plants
- types of propagative material suitable for different times of the year
- preferred propagation media for a range of plant species
- common problems associated with the propagation and growing on of plants in a controlled environment and preventative/corrective action that may apply
- aftercare requirements for a range of propagated plants

- legislation relating to plant propagation including Plant Breeders Rights, Quarantine regulations, plant collection permits and OHS and environmental issues.

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Requirements may include:	• purpose or intended use of the propagated plants • budget limitations • quality and continuous improvement processes and standards • permits or licences for collection of material • environmental management, waste disposal, recycling and re-use guidelines • maintenance activities for propagation after-care • marketing quality and quantity specifications and timelines for the program.
Propagation techniques may include:	• stem • leaf and root cuttings • seed • ground and aerial layering • division or splitting • budding or grafting • spores • tissue culture
Environmental parameters may include:	• temperature • wind • light humidity • frost • these may apply to a field nursery or environmentally controlled structure
OHS hazards may include:	• Air and soil-borne microorganisms • chemicals and hazardous substances • sharp hand tools and equipment • manual handling • plant allergies • solar radiation • dust • noise • machinery and machinery parts • slippery and uneven surfaces
Propagation media characteristics may include:	Propagation media characteristics will be specific to the species and method of propagation, and may need to be determined using recognised testing procedures for pH, drainage, aeration, salinity, nitrate levels and water repellence to ensure that it meets the needs of the propagation program.

	Media types may include: sand, potting mix, gravel, scoria, rock wool, gro-wool, pine bark, perlite, vermiculite and conditioners/additives. All growing media should be sterilized according to workplace guidelines.
Resources may include:	• staff • tools • equipment • machinery • materials • budget
Quarantine regulations may include:	• Relevant and current import and export permits from the Australian Quarantine and Inspection Service (AQIS) • restrictions under the *State Plant Health and Plant Products Act and The Plant Health and Plant Products Regulations* for seeds and plant material from overseas or interstate • regulations set by the Plant Standards Branch of the Department of Primary Industries, fumigation of plant material, nursery isolation facilities and inspections by quarantine officers
Collecting ethics that must be observed:	• No plant is collected from where it is prohibited • obtaining permits from the Department of the Environment and Heritage, if necessary; • collection of minimal material from healthy vigorous plants, permission gained from landowner, if required; • disruption to the site and surrounding vegetation is minimised and justification in collecting material from less common or rare plant species
Conditioning and storage requirements may include:	• Maintaining correct moisture content and temperature range, • bundling and labelling and storing in a quarantine area.
Preparation treatments may include:	• hormone application • fungicides • hot water treatment • disbudding • hydration/dehydration • stratification • scarification • division • sterilisation • smoke treatment
Waste may include:	• plant pots • discarded propagation material • growing media waste • disinfecting/sterilising agents

After care treatments may include:	• fungicides • fertilisers • water • nutrients • insecticides • heat regulation • ameliorants
Cultural intervention procedures may include:	• fertilising • misting • tip/root pruning • light manipulation • application of growth hormones • temperature regulation • increased/decreased humidity • ventilation • tying, staking or taping • removing damaged, diseased or dead plant material • irrigation

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to assess competency in this unit	The learner must be able to: • Comply with guidelines and legislative requirements, including OHS, Plant Breeders Rights and quarantine, environmental and organisational guidelines relevant to propagation activities • Undertake planning procedures for a propagation program • Effectively coordinate appropriate resources • Implement propagation activities in accordance with planned program • Assess propagated plants against marketing requirements, quality specifications and site requirements • Review program and make recommendations.
Context of and specific resources for assessment	The context for assessment for this unit may be in a real or simulated workplace. Specific resources for the assessment of this unit include a real or simulated work place environment suitable for plant propagation, plant material suitable for propagation, materials, tools and equipment relevant to plant propagation, access to computers and the internet, copies of legislation, codes of practice and standards and policies that apply to plant propagation.
Method of assessment	Evidence should be gained through a range of methods to ensure valid and reliable assessment and consistence of performance. Evidence should be gathered as part of a learning process, where appropriate, and could be from assessment of the unit of competency

alone, through integrated assessment of through a combination of both.

Assessment methods could include:

- Oral and/or written questioning to assess knowledge of legislation, standards and procedures that apply to the propagation of plants
- An assignment on a propagation program
- Report of the recommendations for improving propagation program
- Practical demonstration of plant propagation techniques
- Third party reports supporting the evidence gathered.

VU21522	Manage the care and maintenance of trees
Unit Descriptor	This unit covers the skills and knowledge required for the management of tree care and maintenance. It requires the identification of a range of tree species, pests, disease and nutrient deficiencies and other environmental impacts affecting soil condition and general tree health. It includes the ability to recommend treatments and identify requirements in general tree maintenance and management. Pruning activities are limited to a height limit of two metres and do not include aerial pruning from an elevated work platform or from climbing ropes and rigging in a tree. It does not include specialist knowledge and skills of arboriculture and requires the ability to recognise the need for specialist and technical services as required. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. Refer to the employability skills summary to identify employability skill requirements.
Application of the Unit	This unit is applicable to persons working in all sectors of the horticulture industry.

ELEMENT Elements describe the essential outcomes of a unit of competency.	**PERFORMANCE CRITERIA** Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold/italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Examine trees to determine condition	1.1 Identify ***key symptoms and signs that indicate poor health and vigour*** in trees. 1.2 Identify the ***signs and symptoms caused by insects and other pests***. 1.3 Identify ***environmental factors*** that may impact on tree health. 1.4 Identify ***cultural practices*** that may have an effect on tree health. 1.5 Examine trees to determine existing or potential problems and document recommendations for appropriate actions. 1.6 Determine ***preventative approaches for tree protection*** for existing trees and future plantings.
2 Conduct soil tests	2.1 Identify the ***key symptoms of nutritional deficiency*** in trees.

	2.2	Identify ***factors*** that may impact on soil condition and describe the relationship between soil condition and the nutritional status of trees.
	2.3	Conduct soil tests, record results and plan soil amendment strategies, if required.
3 Develop tree maintenance plan	3.1	Research the ***legal aspects and restrictions*** that may impact on tree management.
	3.2	Identify ***OHS hazards and environmental impacts*** of tree management and plan control measures.
	3.3	Establish ***maintenance scope and standards*** for tree management.
	3.4	Source and cost ***resources, tools, equipment and machinery*** required for tree management and confirm availability with suppliers, contractors and appropriate personnel.
	3.5	Determine ***preventative approaches*** to tree management and care and incorporate into the management plan.
	3.6	Document tree management plan, including useful landscape life expectancy and ***risk management strategies***.
4 Source specialist technical services	4.1	Recognise ***limits of own expertise*** in the management of trees and identify and specify actions and/or programs to be undertaken by ***providers of technical services and specialised expertise***.
	4.2	Utilise the services of technical and specialised experts, as required.
	4.3	Prioritise and monitor work activities and make adjustments to the management plan, as required.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

- identify a range of tree species
- recognise a range of common diseases, pests and nutrient deficiencies in trees
- develop appropriate soil amendments strategies in response to soil test results
- research and document information for a tree management program
- recognise the limits of own expertise and when the services of specialist/technical services are required
- communicate with the staff, managers, suppliers, contractors and consultants

Required Knowledge

- a comprehensive range of tree species
- common diseases, pests and nutrient deficiencies in trees
- key symptoms that indicate health and vigour problems in trees

- legislation and regulations relevant to tree management
- OHS hazards and environmental impacts in tree management
- Australian Standards for Pruning of Amenity Trees AS4373
- the principles of Compartmentalisation of Disease in Trees (CODIT)
- principles and methods of pruning to meet given objectives
- maintenance requirements for tree management
- principles of Integrated Pest Management

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Key symptoms and signs that indicate poor health and vigour in trees may include:	• leaf spot • blotch • blight • canker • gummosis • chlorosis • presence of fungi • leaf wilt and disfigurement • defoliation • lack of growth • limb loss • leaf and vein discolouration.
S*igns and symptoms caused by insects and other pests* may include:	• leaf spots • branch dieback • stem and leaf galls • cankers and swellings • webbing • presence of frass • chewed or skeletonised leaves and leaf curling • puckering or rolling.
Environmental factors may include:	• lightening • fire • pollution • poor drainage • inadequate rainfall • run off and salinity

- soil compaction and erosion
- soil oxygen levels
- soil pathogens
- climatic conditions unfavourable to the species.

Cultural practices may include:

- spraying chemicals
- using mowers and brush cutters
- pruning and installation of irrigation systems.

Preventative approaches for tree protection may include:

- restricted or prohibited access to heavy machinery
- excessive foot traffic
- maintenance of grade level
- clear guidelines for staff and contractors working within root zones
- effective watering regime
- formative pruning
- careful planning for tree and site compatibility
- mulching
- regular inspections of trees.

Key symptoms of nutritional deficiency may include:

- tip burn
- chlorosis and necrosis
- leaf and vein discolouration
- wilt, stunted or slow growth
- distorted growth of leaves, flowers and fruit.

Factors that might affect soil condition may include:

- presence or lack of soil organisms
- temperature
- pH levels
- moisture content
- fertility
- salinity
- compaction.

Legal aspects and restrictions that may impact on the maintenance plan may include:

- OHS Acts
- Regulations and Codes of Practice
- *Environmental Protection Act 1994*
- local council regulations
- *Australian Standards for Pruning of Amenity Trees AS4373*
- heritage overlays
- specifications on the Victorian Heritage Register.

OHS hazards and environmental impacts may include:

OHS hazards:

- machinery and equipment operation
- working outdoors
- noise and dust
- manual handling
- chemical use
- falling limbs
- working in a public space.

Environmental impacts:

- damage to soil structure
- off target damage from chemical use
- changes to microclimate following tree removal.

Maintenance scope and standards may include:

- pruning
- monitoring tree health and vigour
- root zone protection
- treatment of pests and diseases
- fertilising
- soil treatments
- removal or replacement of heritage trees.
- aesthetic and amenity value of the tree
- trees already identified as hazardous or problematic
- useful landscape life expectancy
- maintenance required following storm damage
- trees in high traffic areas
- trees which could be a risk to public safety.
- the period covered by the maintenance plan
- how often the tasks are to be undertaken.

Resources may include:

- soil testing consumables
- weed mats
- mulch, stakes
- tree guards
- fencing materials
- soil ameliorants
- fertilisers
- weed, pest and disease control materials
- irrigation and drainage system components.

	• paid and volunteer labour • contractors • suppliers • consultants, including arborists.
Tools, equipment and machinery may include:	• secateurs • pruners • saws • chippers and mulchers • digging and aerating devices • chemical applicators • fuels and oils • personal protective equipment.
Preventative approaches may include:	• integrated pest management • tree and site compatibility • competition control • addition of soil ameliorants • informed plant selection • fertilising and watering regimes • root zone protection • correct planting techniques.
Risk management strategies mean:	Allowing for unforeseen changes to the maintenance plan which could be due to staffing availability, OHS hazards, changes to priorities or the outbreak of plant diseases and environmental damage i.e. wind/storm damage.
Limits of own expertise means:	Limits of own expertise is the point at which the scope and/or complexity of a given job necessitates the outsourcing or particular aspects of tree management to a practitioner more expert in that area.
Providers of technical services and specialised expertise may include:	• certified commercial arborists • foresters • plant health specialists

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to assess competency in this unit	The learner must be able to: • Identify a range of tree species using correct botanical names

- Recognise common diseases, pests and nutrient deficiencies in trees and make recommendations for their treatment
- Undertake tree management within the required legislation and restrictions
- Identify requirements for tree management including maintenance scope and standards
- Recognise limits of own expertise in tree management and source and apply technical/specialist services when required
- Undertake risk management strategies when implementing the tree management plan.

Context of and specific resources for assessment

The context for the assessment of this unit may be in a real or simulated workplace where tree management would be undertaken.

Specific resources required for the assessment of this unit include a real or simulated workplace environment, access to trees, tools and equipment, relevant legislation, computers and industry references and publications.

Method of assessment

Evidence should be gained through a range of methods to ensure valid and reliable assessment and consistency in performance.

Evidence should be gathered as part of the learning process, where appropriate, and could be from assessment of the unit alone, through an integrated assessment activity or a combination of both.

Assessment methods may include:

- Oral and/or written questioning to determine understanding of the relationship between soil condition and nutrient deficiencies and the effect of other soil factors on tree health.
- Practical exercises in identifying priorities in planning tree maintenance and identifying symptoms of tree health problems
- Assignment on recommendations for improving tree health
- Practical demonstration identifying pest, disease and nutrient deficiency problems
- Project on the development of a tree maintenance plan
- Third party report supporting the evidence gathered.

VU21523	Plan, establish and maintain lawns and lawn alternatives
Unit Descriptor	This unit covers planning, establishing and maintaining lawns or lawn alternatives in public recreational open space, and/or domestic situations. It requires knowledge of growth habits and cultural requirements of plants species and cultivars under a range of soil and environmental conditions to encourage the use of alternative plants that require less maintenance, consumption of water and other resources. No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. Refer to the employability skills summary to identify employability skill requirements.
Application of the Unit	This unit is applicable to persons working in all sectors of the horticulture industry.

ELEMENT Elements describe the essential outcomes of a unit of competency.	**PERFORMANCE CRITERIA** Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold/italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Plan the establishment of lawn or lawn alternatives	1.1 Confirm client ***preferences and requirements*** for proposed site.
	1.2 Assess site for ***existing conditions*** and perform necessary ***soil tests.***
	1.3 Research and select ***plant species/cultivars*** and ***planting method*** to suit site and client requirements.
	1.4 Research and comply with ***legislation*** that may impact on the establishment of plants on the site.
	1.5 Identify ***environmental implications*** and, if necessary, report them to relevant personnel.
	1.6 Identify the ***OHS hazards*** associated with plant establishment works and assess and control risks.
	1.7 Develop and document the ***plan*** for the pre and post establishment and ongoing maintenance of the area.
2 Establish lawn or lawn alternatives	2.1 Organise ***resources*** required for the plant establishment.
	2.2 Undertake ***pre-establishment procedures*** according to the plan.

	2.3	Establish plants using planting or installation method consistent with the species requirements.
	2.4	Implement ***post-establishment procedures*** according to the plan.
	2.5	Monitor the newly established planted area**,** identify any problems and implement required changes to the plan.
3 Maintain and monitor lawn or lawn alternatives	3.1	Identify the maintenance requirements covering a ***range of conditions*** according to published data on the species or cultivar, historical records and own experience.
	3.2	Identify and confirm availability of resources, tools, equipment and machinery required for the plant maintenance.
	3.3	Identify OHS hazards and environmental implications associated with the maintenance plan.
	3.4	Plan and implement ***cyclical maintenance procedures*** according to the ***scope and standards*** required by the client.
	3.5	Monitor and review the maintenance plan and take ***remedial action*** in response to changing conditions, where required.

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

- assess site factors and evaluate their impact on the development of plant establishment and maintenance
- recommend suitable plant species for specific uses
- recognise common weeds, pests and diseases
- select appropriate additives for a given situation
- safely operate a range of horticultural machinery and equipment
- comply with OHS and environmental legislation
- make adjustments to maintenance plan in response to changing conditions
- establish client needs and preferences

Required Knowledge

- plant species suitable for use in a lawn or as a lawn alternative
- growth habits and cultural requirements of specific plant species and cultivars under a range of soil and environmental conditions
- assessment of weed potential of plant species selected for lawns or as a lawn alternative
- signs and symptoms of pests and diseases and suitable methods of control
- maintenance requirements and procedures for specific plant species and cultivars after initial establishment
- site assessment techniques including soil analysis

- nutrient requirements of specific plant species and cultivars and the affects of nutrient deficiency and toxicity on individual plant species and cultivars, including visual symptoms
- characteristics of soil and other growth media types, and the use of additives and ameliorants to enhance the available nutrition for specific plant species and cultivars
- characteristics of simple and compound fertiliser products
- legislation and regulations relating to sites and maintenance activities.

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance.

Preferences and requirements may include:

- purpose or intended use of the site
- preferred plant species or cultivars
- plant characteristics
- growth and cultural requirements
- maintenance services
- budget limitations and timelines

Existing conditions may include:

- local climate
- soil types, structure and profiles
- soil drainage characteristics
- nutrient toxicities and deficiencies
- the aspect of the site
- natural and artificial watercourses
- buildings and structures
- services
- other water supplies and quality
- existing plants
- projected patterns of wear

Soil tests may include:

- infiltration rate
- physical characteristics such as colour, texture, structure, and soil type
- depth of root zone
- watertable and chemical characteristics such as pH, salinity and nutrient and carbonate content

Plant species/cultivars may include:

- common lawn grass species
- native grass species
- groundcovers
- low growing plants and herbs

Planting methods may include:

- container stock planting
- sowing
- laying
- rolling
- chaffing
- sprigging
- hydroseeding
- hydrosprigging.

Legislation may refer to:

- nature of ownership
- covenants
- easements
- historical
- cultural or heritage values of the site
- local by-laws including prohibited plant species and land-use restrictions

Environmental implications may include:

- improved drainage and soil structure
- minimisation of water and fertiliser run-off
- removal of weeds
- improvement of the aesthetics of the site.

OHS hazards may include:

- disturbance or interruption of services
- solar radiation
- dust
- noise
- soil
- chemicals and hazardous substances
- sharp hand tools and equipment
- manual handling
- slippery and uneven surfaces

A ***plan*** may include:

- staged timelines
- availability of staff
- costs
- resources and equipment
- pre and post-establishment activities
- scope and standards of maintenance procedures

Resources may include:

- seeds
- plants
- tools
- equipment such as hand tools (rakes, spreaders, shovels, turf spades, rollers, wheelbarrows, hoses and hose fittings)
- machinery such as trailed or motorised equipment, sod cutters, mechanical rollers, edgers and trimmers; fertiliser spreaders, top-dressing machinery, levellers and tractors and 3-point linkage equipment

Pre-establishment procedures may include:

- Grading
- Contouring
- Levelling
- installing drainage and irrigation
- soil preparation and cultivation
- weed control

Post-establishment procedures may include:

- watering
- fertilising
- mowing
- mulching
- weed control
- prevention of access to establishing areas

Range of conditions may include:	• weather • seasonal influences • soil characteristics • nature and frequency of use of the site • fertiliser history • weed competition • irrigation methods and scheduling • spraying program and soil management practices
Cyclical maintenance procedures may include:	• soil testing • fertilising • watering • rolling • mowing • monitoring plant health • pest and disease control • replanting • renovating and repairing wear and damage where necessary
The ***scope and standards*** of maintenance may include:	• plant care • treatment of weeds, pests and diseases • mowing • edging • maintenance of irrigation and drainage systems
Remedial action may include:	• adjustments to irrigation scheduling and nutrient application rates • pest and disease control • replacement of stock • changes to soil management practices • rescheduling maintenance tasks

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to assess competency in this unit	The learner must be able to: • Comply with client preferences and requirements in establishing and maintaining a lawn or lawn alternatives • Comply with relevant legislation • Plan and implement procedures for the establishing and maintaining a lawn or lawn alternatives • Monitor newly established plants and implement changes to the plan, where required • Undertake maintenance procedures over a range of conditions • Monitor and review the plan and implement necessary changes.

Context of and specific resources for assessment	The context for the assessment of this unit may be in a real or simulated workplace where establishment of an area of lawn or lawn alternatives would be undertaken. Specific resources required for the assessment of this unit include a real or simulated workplace environment, a site for establishing a lawn or lawn alternatives, access to plants, materials, tools and equipment; relevant legislation, computers and industry references and publications.
Method of assessment	Evidence should be gained through a range of methods to ensure valid and reliable assessment and consistency in performance. Evidence should be gathered as part of the learning process, where appropriate, and could be from assessment of the unit alone, through an integrated assessment activity or a combination of both. Assessment methods may include: • oral and/or written questioning to determine understanding of plant cultural requirements and relevant legislation • assignment in developing a documented plant establishment plan • practical demonstration of establishing plants • records of maintenance activities for a lawn or lawn alternatives • third party report on the evidence gathered.

VU21524	Select, use and apply geographical information system (GIS) technology
Unit Descriptor	This unit covers the skills and knowledge required to choose appropriate GIS technology to support the organisation's activities and decision making and to develop strategies to ensure the data/information is used effectively No licensing, legislative, regulatory or certification requirements apply to this unit at the time of publication.
Employability skills	The required outcomes described in this unit of competency contain applicable facets of Employability Skills. Refer to the employability skills summary to identify employability skill requirements.
Application of the Unit	This unit is applicable to persons working in all sectors of the horticulture industry.

ELEMENT Elements describe the essential outcomes of a unit of competency.	**PERFORMANCE CRITERIA** Performance criteria describe the required performance needed to demonstrate achievement of the element. Where bold/italicised text is used, further information is detailed in the required skills and knowledge and/or the range statement. Assessment of performance is to be consistent with the evidence guide.
1 Evaluate the need for GIS technology	1.1 The organisational tasks and decision making that could be supported by GIS technology are identified and evaluated
	1.2 Opportunities and limitations for operational improvements that may result from adopting GIS are assessed
	1.3 Equipment and software requirements and options are evaluated
	1.4 The cost-benefit of using GIS technology is evaluated
	1.5 Independent technical advice and sources of information are sought as required
	1.6 The ***evaluation*** and recommendations on the need for GIS technology are presented
	1.7 A plan to incorporate the use of a GIS to improve operational efficiency and sustainability is developed
2 Capture, store, manipulate and analyse data	2.1 The various ***methods of data capture*** are used as appropriate for the specified outcomes
	2.2 The manipulation of data for ***modelling and mapping*** purposes is used for a range of applications

	2.3	The translation of data from raster to vector is undertaken in relation to a specified data
	2.4	Sources of inaccuracies in GIS data and strategies for addressing them are explained
3 Evaluate the use of GIS technology	3.1	Strategies to ensure GIS technology is used effectively within the organisation are developed and reviewed regularly
	3.2	The effective use of GIS technology to meet organisational needs is evaluated
	3.3	The need for technology training is assessed
	3.4	***Barriers*** to the effective use of the technology are identified
	3.5	Actions to address barriers to the effective use of GIS technology are developed

REQUIRED SKILLS AND KNOWLEDGE

This describes the essential skills and knowledge and their level, required for this unit.

Required Skills

- identify a range of software systems and how to apply them
- interpret land management maps/plans to apply to business operations
- analyse digital map images
- work cooperatively with other staff in an organisation
- assess and review information
- identify appropriate training and support for staff
- identify and manage issues that may arise in the use of the technology

Required Knowledge

- basic principles of GIS technology and applications
- mapping principles of GIS
- spatial calculations using GIS
- basic principles of cost-benefit analysis
- equipment and software requirements
- context in which particular organisations operate and how these may impact on the selection and use of technology
- potential barriers to learning, and strategies to address these
- range of GIS technology options available to support organisational activities
- strategies that can be used to evaluate information regarding technology
- training options available to the organisation to develop skills in the use of technology

RANGE STATEMENT

The Range Statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance

Evaluation may include but is not limited to:	• effectiveness, including cost effectiveness • human impacts • level of training need • reliability • suitability • sustainability
Methods of data capture may include but are not limited to:	• transfer of hardcopy material into a digital medium • remotely sensed data • satellite remote sensing
Modelling and mapping may include but are not limited to:	• integration of 2 and 3 dimensional characteristics • topological • hydrological • cartographic • overlays
Barriers may include but are not limited to:	• cost • staff training • integration with other IT platforms

EVIDENCE GUIDE

The evidence guide provides advice on assessment and must be read in conjunction with the Performance Criteria, Required Skills and Knowledge, the Range Statement and the Assessment section in Section B of the accreditation submission.

Critical aspects for assessment and evidence required to assess competency in this unit	The learner must be able to: • choose appropriate GIS technology to support the organisation's activities • use GIS technology applications to support organisational decision making • develop strategies to ensure GIS technology is used effectively within the organisation • communicate recommendations to others
Context of and specific resources for assessment	For valid assessment, the candidate must have an opportunity to undertake a range of exercises and practical assessments that demonstrate the skills and knowledge required in this competency. The context for the assessment of this unit may be in a real or simulated workplace applicable to horticulture. Specific resources required for assessment of this unit include a real or simulated horticultural work environment, a computer, GIS software and internet access and access to information on GIS technology.

Method of assessment	Evidence should be gained through a range of methods to ensure valid and reliable assessment and consistence in performance. Evidence should be gathered as part of the learning process where appropriate and could be from assessment of the unit of competency alone, through an integrated assessment activity or through a combination of both. Assessment methods could include: • observation of performance in the use of GIS technology • direct questioning combined with reflection on assessment and evaluation processes • analysis of responses to case studies and scenarios • observation of presentations and group discussions • oral or written questioning to assess knowledge