

National Turf Industry Delivery and Assessment Standard

AHC31316 Certificate III in Sport Turf Management

Validated and Endorsed December 2017



National Turf Education Working Group
(NTEWG)
[5/12/2017]

Introduction

In 2003, the Australian Golf Course Superintendents Association (AGCSA), in conjunction with the wider turfgrass industry formed the National Turfgrass Education Working Group to review the current educational pathway and establish an industry supported standard throughout Australia. The Committee's role is to ensure that all education is delivered in a uniform manner across Australia.

The National Turfgrass Education Committee has representatives encompassing all sectors of the industry including Registered Training Organisations, Industry associations and practicing turf managers.

The National Turf Industry Delivery and Assessment Standards have been compiled by the National Turf Education Working Group.

These standards are based on the performance and knowledge evidence of the curriculum and assessment requirements of units. These standards are reviewed, validated and endorsed by members and industry representatives annually.

Industry expects that these standards be used as the minimum when assessing the National Training Package AHC31316.

Industry also expect students receive training at the minimum number of hours mentioned in each of the unit guides.

These industry standards include the 11 core units for the Certificate III – Sports Turf Management and a further six which are recommended electives to complete the 16 units of competency required to fulfil the qualification.

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Certificate III in Sports Turf Management.
AHCIRG331 Install pressurised irrigation Systems

Introduction

This competency standard covers the process of installing and commissioning pressurised irrigation systems. It requires the ability to organise resources for installation work; set out and prepare the site; install irrigation components; commission irrigation systems and communicate with work team members. Installing irrigation systems requires knowledge of methods of irrigation, components of irrigation systems and behaviour of water within piped systems. Commissioning, irrigation systems requires knowledge of soil water retention; water infiltration characteristics and turf/plant water use. This unit of competency covers the skills and knowledge required to install low and sprinkler volume irrigation systems.

It applies to individuals who take responsibility for own work and for the quality of the work of others. They use discretion and judgement in the selection, allocation and use of available resources. All work is carried out to comply with workplace procedures.

No occupational licensing, legislative or certification requirements are known to apply to this unit at the time of publication

Industry recommends a minimum of 55 hours be allocated to deliver this unit of competency.

Activities & Assessment:

1. Organise resources for installation. The installation site needs to be checked for possible WHS, environmental issues or site regulations. Irrigation plans checked to identify any problems with the site. Parts list produced and checked against the plan. Water supply and pump specifications to be checked against pressure and flow requirements. Basic Hydraulics of system checked against the plan to ensure uniform water coverage. ie: friction losses, flow charts, sprinkler specification charts

Assessment by parts list from supplied irrigation system plan written assignment and parts identification test (closed booked)

2. Set out and prepare the site. Site needs to be measured and pegged out consistent with the plan. Environmental protection measures are installed. Students must demonstrate an ability to locate services in the area. Trenches to be dug as per specifications, check regulations that apply to irrigation installation.

Assessment by practical demonstration.

3. Install irrigation components. Irrigation system is installed to the design specifications. Students are able to identify and correctly name the components of an irrigation system. Components are installed using the correct gluing/joining techniques.

Assessment by practical demonstration.

4 Complete installation work. The site is restored to original levels and contours; care is taken when back filling trenches to ensure correct soil consolidation. Tools and equipment is to be cleaned and returned to store. Waste material is removed and disposed of in an environmentally friendly manner. An as constructed plan is to be prepared.

Assessment by practical demonstration and written assignment.

5 Commission irrigation system. The system needs to be started or commissioned in the correct sequence with all components flushed and tested. Sprinkler output is checked using catch cans and calculating distribution of uniformity to ensure that the coverage is uniform. Students need to be able to read a pressure gauge and interpret the results. Students need to be able to set up irrigation runtimes and frequency; given turf water needs soil type and weather conditions.

Assessment by practical demonstration and written test (closed book)

Key Terms:

Available Moisture, Backflow Prevention, Ball valve, Crop Factor, Electrofusion, Evaporation, Evapotranspiration, Flow Rate, Friction Head, Infiltration rate, Micron, Pipe class, Polyethylene, Precipitation Rate, PVC, Risers, Solenoid valve, Solvent Weld, Stop cock.

Resources:

Books:

NTEWG	Certificate III Sports Turf Management Resource Workbook
K. Handreck and N. Black, 2010,	Growing Media for Ornamental Plants and Turf, 4th Edition
<u>Pete Melby</u> , 1995, New York	Simplified Irrigation Design, 2nd Edition
Richard Choate, 1995, Texas	Turf Irrigation Manual
USGA, 1997, CRC Press	Wastewater Reuse for Golf Course Irrigation
Various, 2003, John Wiley & Son	Golf Course irrigation, Environmental Design and Management

Internet:

Irrigation toolboxes

<http://toolboxes.flexiblelearning.net.au/demosites/series6/605/html/index.htm>

Hunter Irrigation

<http://www.hunterindustries.com/>

Irrigation Australia (IA) learning guides -

<http://www.irrigation.org.au/index.cfm?/publications/downloadable-publications>

Rainbird Australia

<http://www.rainbird.com/au/index.htm>

Toro Irrigation Australia

<http://www.toro.com.au/irrigation/content.cfm?page=4>

Philmac Pipe size ruler –

<http://www.philmac.com.au/>

Iplex

<http://www.iplex.com.au/iplex.php?section=3>

Vinidex

http://www.vinidex.com.au/page/stormwater_pvc_pipe_systems.html

Certificate III in Sports Turf Management.
AHCMOM304 Operate Machinery and Equipment

Introduction

This unit covers the competent operation of a range of turf industry machinery and equipment (see list). This unit is designed to be carried out on a range pedestrian and ride-on machinery operated within the sports turf industry. The unit is aimed at training and assessing safe, competent operators who will be able to perform day to day tasks, adjustments and maintenance and work under minimal supervision. Note that other competencies cover basic machinery operation.

Industry recommends a minimum of 60 hours be allocated to deliver this unit of competency.

Activities & Assessment:

1. **Operate turf machinery:** students will be individually assessed for safe operation of at least 10 of the following machine types, including at least **five** of the turf specific machines. Referring to operators manuals where required. The assessment will include pre-start checks, stop/start procedure, operation, adjustments, daily maintenance, clean and store, maintenance records and minor maintenance.

Turf Specific

turf scarifier

sodcutter

turf roller

electric reel mower

motorised reel mower

aerator

out front rotary mower

bunker rake

top dresser

edger

Non Turf Specific

rotary mower

motorised spray equipment

utility vehicles

blower

PTO implement

brush cutter/whipper-snipper

rotary hoe

trenching machine

tractor

Assessment by individual practical demonstration and written test (closed book)

2. **Operate turf equipment:** students will be individually assessed for safe operation of at least **five** of the following turf specific pieces of equipment. The assessment will include operation, adjustments, daily maintenance, clean and store, maintenance records and minor maintenance.

Turf doctor, Stimp metre, Level lawn, Line marker, Hole cutter, Clegg Hammer, Back Pack-Sprayer, Soil moisture metre

Assessment by individual practical demonstration and written test (closed book)

3. WHS/OH&S: students are required to demonstrate safe operation (eg: personal protective equipment, signage, check site conditions etc).

Assessment by individual practical demonstration and written test (closed book)

4 Log Book: students are also required to maintain a record of machinery operated.

Assessment by completion of Machinery Use Log Book.

Key Terms:

Standard operating procedures, Procedure sheets, Industry standards, Manufacturers specifications, Operators manual, Procedures and guidelines, WHS procedures, Oral and written procedures/contracts, Spray application log book/diary, Operation log book/diary, Licenses, Training requirements, Risk assessments.

Resources:

Printed Material

Codes of practice for - Plant and equipment, Machinery safety guards, Noise limits and hearing protection, Storage and Handling of Dangerous Goods (Fuels).

Machinery Operators Manuals.

Standard Operating Procedures for machinery and equipment

Internet

Machinery manufacturer's websites

Workcover / Worksafe

www.safeworkaustralia.gov.au/sites/SWA

Vocam videos

www.vocam.com/au/

Certificate III in Sports Turf Management.
AHCPCM301 Implement a Plant Nutrition Program.

Introduction

This unit of competency describes the skills and knowledge required to monitor and control the nutritional requirements of and applications to plants across a range of situations and environments. Students will implement a plant nutrition program for Sports Turf Management defining the standard required to: recognise a range of common causes of nutrient deficiency; prepare and apply fertilisers and other products to turf; clean up and maintain tools and equipment and record work activities according to enterprise guidelines.

Industry recommends a minimum of 50 hours be allocated to deliver this unit of competency.

Activities & Assessment:

1. **Demonstrate** an underpinning knowledge on plant nutrition incorporating the following:

Knowledge on the relationship between soil characteristics and the availability and cycling of nutrients is required to complete this competency. Topics for this section will include physical and chemical soil properties, pH and soil buffering capacity, cation exchange capacity and salinity. Include introduction to various soil ameliorants and the reasons for their selection.

Knowledge of various forms of fertilisers including but not limited to simple, compound, water soluble, slow and controlled release and organics and the factors that determine their release.

Nutrient uptake by plants will be discussed within this competency. Topics to include but not be limited to; root and foliar uptake, plant available forms of nutrients, factors that affect nutrient uptake.

Essential macro and micro nutrients relevant to plant/turfgrass growth will be covered. Topics will include but not be limited to: the role of each nutrient and indicators that assist in the identification of nutrient deficiencies and toxicities.

Characteristics of plant/turfgrass fertilisers will be covered. Topics will include but not be limited to: nutrient percentages of fertilisers, ratios, fertiliser calculations with an emphasis on converting rates of fertiliser into rates of nutrient and cost.

Knowledge of environmental implications of nutrients and how best to minimise their impact. Topics to be covered include: nutrient leaching, accurate application methods, run-off, nutrient loading, dust and noise.

Assessment by a series of written tests (closed book)

2. **Preparation and application** of specific fertilisers - size of area measured, nutrients calculated, fertiliser quantities prepared and applied. Tools, equipment and machinery will be selected according to workplace and manufacturers specifications. Conduct site hazard identification and risk control assessment. PPE selected and tools and equipment cleaned and stored. Application rates are recorded and tools for monitoring are outlined.

Implement a basic NPK plant nutrient program including the calculation of actual nutrients per 100m². Understands programs for two sports surfaces such as golf course greens, tees or fairways, sports grounds, bowling greens, horse racing track or similar. Programs must include frequency of applications, timing, play commitments, grass type and take into account soil test results.

Assessment by assignment based on supplied soil test.

Key Terms:

Soil properties, pH, soil buffering capacity, cation, salinity, soil ameliorants, compound fertilisers, water soluble, slow and controlled release, foliar uptake, nutrient leaching, nutrient loading.

Resources:**Books**

NTEWG	Certificate III Sports Turf Management Resource Workbook
K.Handrek; N.Black	Growing Media for Ornamental Plants & Turf, 2002
Beard. James B	<i>Turfgrass Science and Culture</i> . New Jersey. 1973.

Internet

Bayer Amplify

www.bayeramplifyturf.com.au/en/Turf/

<http://toolboxes.flexiblelearning.net.au/demosites/series4/408/index.html>

Certificate III in Sports Turf Management.**AHCPM302 Provide Information on Plants and their Culture**

Introduction

The unit covers the skills & knowledge of providing information about sports turf grasses, ornamental and native plants and their cultural requirements to the employer, players and other interested parties on request and within the sports management environment. The unit requires the student to identify the optimum growth environment for all of the plants studied. This unit requires botanical and identification skills in relation to turfgrass species and other ornamental plants including trees, shrubs, annuals & perennials. This unit is the primary botanical unit in this course.

Industry recommends a minimum of 55 hours be allocated to deliver this unit of competency.

Activities & Assessment:

1. Turf Identification: Identify at least 15 turf grasses, to be named to common name.

Assessment by pressed Herbarium Collection or photographic assignment (comprising of clear, original images of the plant) and the examination and identification of live material (closed book)

2. Ornamental Plants: Identify at least 30 local important plants, to be identified by common name and its common use.

Assessment by pressed Herbarium Collection, video or photographic assignment comprising of multiple original and dated images (Internet downloads not acceptable). and the examination and identification of live material (closed book).

2. Botany: Notes in 'Plain English' are compiled on plant external and internal structure to a cellular level. This includes basic plant chemical processes of respiration, photosynthesis, transpiration and plant growth.

Assessment by knowledge quiz (closed book) and tasks undertaken throughout the course.

3. Plant Selection: The cultural requirements and sports surface qualities of at least 10 sports turf grasses will be understood and used as the basis for plant selection. The cultural requirements and uses of at least 30 Ornamental plants are selected on the basis of light, water, warmth, etc. and aesthetic requirements (display bed, screening shrub, flowering tree).

Assessment by assignment, and knowledge tests (closed book) undertaken throughout the course.

Key Terms:

Monocotyledon, dicotyledon, roots, leaves, meristematic, respiration, photosynthesis, osmosis, transpiration, stomata, phloem, xylem, rhizomes, stolons, runners, tillers, crown, flowers, ligules, auricles, vernation, cool season, warm season, Perennial, Annual, sexual propagation, asexual propagation, clones, hybrid, variety, cultivar, selection, node

Resources:

Toolboxes / <http://toolboxes.flexiblelearning.net.au/demosites/series6/605/html/index.htm>

**NB: The NTEWG has applied to exchange this unit of competency with:
AHCPM303 Identify Plant Specimens**

Certificate III in Sports Turf Management.

AHCPMG301 Control Weeds

Introduction

This unit of competency describes the skills and knowledge required to plan and coordinate weed control activities. In the context of the Sports Turf Management qualification, industry has driven content based on the information students need to be competent and to function in the work place. This unit needs to cover the control of weeds as students will be required to: identify a range of weeds and beneficial organisms; plan and coordinate weed control activities; prepare and calibrate equipment; conduct a site hazard identification and risk control assessment for weed control; apply a range of weed control methods and maintain records; monitor, record and report the effectiveness of controls

Industry recommends a minimum of 70 hours be allocated to deliver this unit of competency.

Activities & Assessment:

In order for students to be deemed competent in this unit, they must successfully complete all of the following components

1. Written Assessment

The written assessment will be a closed book test. Assessment is based on the knowledge criteria and the assessment requirements of the unit.

Assessment Details

Written Assessment covering the following;

- Identification of a range of weeds and beneficial organisms in the work area
- Identify target weeds at different growth stages then identify threshold/ tolerance levels.
- conduct a site hazard identification and risk control assessment for weed control
- the lifecycle and ecology of a range of relevant weeds in the area
- the cyclical nature of weeds and control programs
- weed characteristics incl. how weeds grow and spread and methods of weed dispersal
- new and emerging weed species present in the area
- how plant health or growth requirements can be compromised by infestation levels
- economic, aesthetic, health, fire hazard and environmental thresholds for a range of weeds, common to the area
- non-target plants common to the area, especially plants with morphological features similar to the target pest plant
- risk factors including human, animal and environmental associated with control measures
- how to conduct activities in a manner that avoids or minimises disturbance to other plant or animal species
- signs of adverse impact on humans, animals, non-target plants and the environment due to implemented control measures and ways of minimising these adverse effects
- types of equipment including ppet appropriate to the control measure
- work health and safety and legislative requirements pertaining to weed control and the use of cultural, biological and chemical agents
- relevant parts of the organisation's pest management plan and survey strategy
- prepare, maintain and calibrate equipment
- select and apply weed management methods appropriate to the context
- suitable weed control measures and timings based on key IPM concepts
- weed control methods, when they should be selected, including prevention strategies
- minimise damage to non-target species and the environment
- apply work health safety and appropriate sustainability practices in the context of own work

2. Practicals / Worksheets

Students will need to show competence in a series of practical tasks and record activities in four worksheets based on performance criteria and assessment requirements of the unit.

Assessment Details

Practicals / Worksheets covering the following;

- identify range of weeds and beneficial organisms in the work area
- beneficial organisms in the area
- identify threshold levels or tolerance of weeds
- identify target weeds at different growth stages
- conduct a site hazard identification and risk control assessment for weed control
- hazard identification and risk assessment methodologies
- the lifecycle and ecology of a range of relevant weeds in the area
- the cyclical nature of weeds and control programs
- how weeds grow and spread and methods of weed dispersal
- weed characteristics
- new and emerging weed species present in the area
- how plant health or growth requirements can be compromised by infestation levels
- economic, aesthetic, health, fire hazard and environmental thresholds for a range of weeds, common to the area
- non-target plants common to the area, especially plants with morphological features similar to the target pest plant
- risk factors including human, animal health and environmental associated with control measures
- how to conduct activities in a manner that avoids or minimises disturbance to other plant or animal species
- signs of adverse impact on humans, animals, non-target plants and the environment due to implemented control measures and ways of minimising these adverse effects
- types of equipment including personal protective equipment appropriate to the control measure
- work health and safety requirements pertaining to the use of cultural, biological and chemical agents
- relevant parts of the organisation's pest management plan and survey strategy
- legislative requirements relevant to weed control.
- plan and coordinate weed control activities
- prepare, maintain and calibrate equipment
- select and apply weed management methods appropriate to the context
- suitable weed control measures and timing of weed control activities based on:
- key concepts of Integrated Pest Management
- weed control methods and when they should be selected, including prevention strategies
- minimise damage to non-target species and the environment
- apply work health and safety practices in the context of own work
- apply appropriate sustainability practices in the context of own work
- a range of site-monitoring techniques that may be used to implement the weed control plan
- maintain records of weed management activities
- monitor, record and report the effectiveness of methods

3. Identification of 40 locally significant weeds to Common Name

In this task, students will be provided with fresh weed samples from their weed study list. Students are required to:

Identify a range of weeds and beneficial organisms in the work area, and either;

- List a minimum of two controls, (not just chemical or pull out)
- Determine environment the weed is located
- Determine weed lifecycle

Assessment Details

Assessed on class work.

Key Terms:

EPA management systems, Industry Code of Practice, Material Safety Data Sheets, Product Labels, Workcover Guidelines, OH&S Procedures, Spray Application Log Book/Diary, Cultural Practices Log Book/Diary, Chemical Applicators Licenses, Risk Assessments

Resources:

CRC for Australian Weed Management Developing and implementing a weed management plan

Books:

NTEWG	Certificate III Sports Turf Management Resource Workbook
Auld, R.AA. & Medd, R.W. (1987)	<u>Aust Weeds; Illustrated Botanical Guide</u> ; Inkata Press, Melbourne
Lamp C and Collet F	Field Guide to Weeds in Australia Inkata Press, Melbourne
McCarty, Everest, Hall Murphy Yelverton	Color Atlas of Turfgrass Weeds. John Wiley and Sons, New Jersey

Internet

<http://www.weeds.crc.org.au/>

www.msds.com,

http://www.weeds.org.au/ident_resources.htm

<http://www.croplife.org.au/industry-stewardship/resistance-management/>

<http://apvma.gov.au/>

<http://www.bayeramplify.com.au/>

Certificate III in Sports Turf Management.
AHCPMG301 Control Plant Pest and Disease Disorders

Introduction

This unit of competency describes the skills and knowledge required to control plant pests, diseases and disorders, taking into consideration Integrated Pest Management options. The unit describes the skills and knowledge required by the sports turf industry to identify a range of pests, diseases and disorders and beneficial organisms, assess damage or threat to plants and select and apply pest and disease controls and timing of operations. It includes preparing and calibrating equipment, monitoring the effectiveness of controls and keeping records.

Industry recommends a minimum of 70 hours be allocated to deliver this unit of competency.

Activities & Assessment:

In order for students to be deemed competent in this unit, they must successfully complete all of the following components

1. Written Assessment

The written assessment will be a closed book test. Assessment is based on the performance criteria and the assessment requirements of the unit.

Assessment Details**1. Written Assessment covering the following;**

- identify pests, diseases and disorders, beneficial organisms and host plants in target area
assess damage or threat to plants
- select and apply pest and disease management options and determine timing of operations according to pest management plans, to maximise impact on target species and minimise risks to non-target plant and animal species in the area
- monitor the effectiveness of pest and disease management methods
- keep records of pest and disease management activities to regulatory and enterprise standards
- follow of work health and safety procedures when carrying out pest and disease management activities
- apply appropriate environmental sustainability practices when planning and carrying out work
- pest, disease and disorder and symptom recognition of host stress
- economic, aesthetic or environmental thresholds for a range of plant pests, diseases and disorders
- chemical, biological and cultural methods and treatments available to the enterprise within the parameters of an Integrated Pest Management program
- range and use of tools, equipment and machinery available to the enterprise for implementing the management measures
- range of site monitoring and analysis techniques that may be used to implement an Integrated Pest Management program
- implications of choice of plant pest and disease methods with site limitations, environmental implications, end market and production or environmental objectives for the site
- basic principles of Integrated Pest Management standards or industry Code of Practice
- work health and safety responsibilities for employees and employers
- correct use, maintenance and storage of personal protective equipment
- work health and safety and environmental legislative requirements including hazardous substances regulations

2. Written Assignment

From your place of employment, you are to design and produce a visual diary/ display book that shows all the pests and diseases that have occurred at your workplace over the last year. You **MUST** include a minimum of ten (10) pests, made up of five (5) insects and five (5) diseases.

NB: The final product must be printed in colour and suitably bound.

Assessment Details

Written Assignment covering the following;

- identify pests, diseases and disorders, beneficial organisms and host plants in target area
- assess damage or threat to plants
- select and apply pest and disease management options and determine timing of operations according to pest management plans, to maximise impact on target species and minimise risks to non-target plant and animal species in the area
- prepare and calibrate equipment
- monitor the effectiveness of pest and disease management methods
- keep records of pest and disease management activities to regulatory and enterprise standards
- follow of work health and safety procedures when carrying out pest and disease management activities
- apply appropriate environmental sustainability practices when planning and carrying out work
- pest, disease and disorder and symptom recognition of host stress
- economic, aesthetic or environmental thresholds for a range of plant pests, diseases and disorders
- chemical, biological and cultural methods and treatments available to the enterprise within the parameters of an Integrated Pest Management program
- range and use of tools, equipment and machinery available to the enterprise for implementing the management measures
- range of site monitoring and analysis techniques that may be used to implement an Integrated Pest Management program
- implications of choice of plant pest and disease methods with site limitations, environmental implications, end market and production or environmental objectives for the site
- basic principles of Integrated Pest Management standards or industry Code of Practice
- work health and safety responsibilities for employees and employers
- correct use, maintenance and storage of personal protective equipment
- work health and safety and environmental legislative requirements including hazardous substances regulations

3. Identification of 25 locally significant to plant pest diseases and disorders to common name

In this task, students will be provided with photos of the pest, disease and or disorder from their pest study list.

Students are required to name the sample by common name as well as either;

- Determine at least two logical controls (NOT just pull out, or chemical)
- Determine lifecycle of the pest
- Determine environment the weed would be found
- Determine time of year of likely infection / infestation

Assessment Details

Written Assignment covering the following;

- identify pests, diseases and disorders, beneficial organisms and host plants in target area
- assess damage or threat to plants
- select and apply pest and disease management options and determine timing of operations according to pest management plans, to maximise impact on target species and minimise risks to non-target plant and animal species in the area
- pest, disease and disorder and symptom recognition of host stress
- chemical, biological and cultural methods and treatments available to the enterprise within the parameters of an Integrated Pest Management program
- basic principles of Integrated Pest Management standards or industry Code of Practice

Key Terms:

EPA management systems, Industry Code of Practice, Material Safety Data Sheets, Product Labels, Workcover Guidelines, WH&S Procedures, Spray Application Log Book/Diary, Cultural Practices Log Book/Diary, Chemical Applicators Licenses, Risk Assessments

Resources:

Books:

NTEWG	Certificate III Sports Turf Management Resource Workbook
Smiley, Dernoeden & Clarke	Compendium of Turfgrass Diseases
Beard, JB	Turfgrass Science and Culture
Beehag, Kaapro and Manners	Pest Management of Turfgrass for Sport and Recreation

Internet

www.msds.com

<http://www.apvma.gov.au/products/>

Turf Tool Box –

http://toolboxes.flexiblelearning.net.au/demosites/series4/408/html/pages/work_area/work_area.html

<http://www.ecogrow.com.au/>

<http://www.environment.nsw.gov.au/resources/sustainbus/07588GolfCoursesPt3.pdf>

Certificate III in Sports Turf Management.
AHCTRF301 Construct Turf Playing Surfaces

Introduction

This unit covers the process of constructing soil profiles for the establishment of high performance sports and recreational turf surfaces and defines the standard required to: determine turf construction requirements from plans; survey and create working plans for turf construction sites; excavate earthworks and establish working and finished levels; install drainage and irrigation systems; implement a turf construction project.

Industry recommends a minimum of 75 hours be allocated to deliver this unit of competency.

Activities & Assessment:

1. Specific surface requirements and dimensions of relevant turf playing areas including:

- Bowling greens
- Golf greens
- Lawn Tennis courts
- Football ovals
- Cricket wickets
- Racetracks
- Synthetics and others

Assessment by research assignment or quiz

2. Undertake basic surveying and levelling techniques appropriate to the construction of turf playing surfaces.

Assessment by practical exercise.

3. Install cut and fill pegs, base design, subsurface drainage, drainage layer and rootzone material.

Assessment by practical exercise.

4. Plan, schedule and prepare cost estimates for turf construction project including WHS and environmental considerations, location of all boundaries and services in relation to site

Assessment by assignment.

5. Students are made aware of the variety of turf construction profiles including but not limited to localised construction methods, natural construction methods, push up greens, sand over clay construction method, soil amendments, perched water table, USGA Method of Construction, Californian method of construction as well as construction profiles for cricket wickets.

Assessment by Closed book knowledge test

6. A range of physical and chemical root zone and gravel materials tests are conducted and assessed for suitability against industry standards.

Assessment by assignment work and involvement in practical exercises.

7. Students will examine and /or be involved in at least three different landmark construction case studies and study the application of construction and soil science principles in each case including various base designs, various drainage pattern designs, surface falls and various rootzone ameliorants.

Assessment by assignment work and involvement in practical exercises.

Key Terms:

USGA, Perched water table, California method, infiltration rate, porosity, moisture retention, field capacity, sieve analysis, capillary and non capillary. drainage head. Base falls.

Resources:

Books:

McIntyre & Jakobsen	Drainage for Sports Turf and Horticulture, ACT 1998
University of California	Specifications for a Californian Method green Construction.
Handrick and Black	Growing Media for Ornamental Plants and Turf
McIntyre and McIntyre	Cricket Wickets Science v Fiction
NTEWG	Certificate III Sports Turf Management Resource Workbook

Internet

USGSA
www.usga.org

Video

Constructing a USGA Green.

Introduction

This unit covers the skills, knowledge and process involved in establishing turf for sporting grounds, golf courses and public recreational open space and defines the standard required to: interpret basic soil physical and chemical properties, (pH, texture, structure). Determine turf establishment methods and requirements from plans, client's quotations or instructions; organise equipment and machinery for a turf establishment project; implement successful turf establishment works; operate and store turf establishment machinery and equipment; report in writing on completion. This is not a turfgrass botany unit, but a practical establishment competency as deemed by the sports turf industry.

Industry recommends a minimum of 60 hours be allocated to deliver this unit of competency

Activities and Assessment

1. Prepare the site: steps include: Soil samples from the representative area are packaged, labeled and sent for laboratory testing. Testing results are to be interpreted to guide soil preparation. Basic interpretation of the soils physical (texture / structure) and chemical (pH) properties are considered, and the application of suitable amendments, decisions on soil cultivation, pre-plant weed, Pest & Disease control.

Assessment by practical demonstration.

2 Propagation principals with turfgrasses: Placement and planting method of the plant material are consistent with the turf type. The biology of asexual vs sexual propagation, including the advantages and disadvantages of each, and the practical considerations of dealing with vegetative material vs seed are understood, use of growth cloths.

Assessment by written test closed book

3 Establishment by seed: A practical activity on seeding principles of a turfgrass area.

Assessment by practical demonstration, including pre and post establishment procedures.

4 Establishment by vegetative mean: A practical activity on sprigging, chaffing, plugging, a turfgrass area. Understanding of the principles and processes required to achieve a suitable surface.

Assessment by practical demonstration, including pre and post establishment.

5 Establishment by turfing: A practical activity on turfing (sodding) a turfgrass area. Principles and practices are followed to care for sod prior to and after laying.

Assessment by practical demonstration, including harvesting and laying Turf, and pre and post establishment procedures.

6 Specific surface requirements and dimensions of relevant turf playing areas including:

- Bowling greens
- Golf greens
- Lawn Tennis courts
- Football ovals
- Cricket wickets
- Racetracks
- Synthetics and others

Assessment by research assignment

7. Turf Identification: Identify at least 15 Turf grasses, named to common name, genus and species level.

Assessment by identification of live material.

Key Terms:

Hydro-seed, sod quality, shovels, level-lawn, rollers, rotary hoe, tiller, basic grass structural terms, asexual propagation, sexual propagation, vegetative propagation, sprigging, sod cutter, compaction tests, pH, salinity, soil testing, soil texture, soil type, NPK, ameliorant and amendments, pre-emergent and post-emergent pesticides, soil cultivation, over sprigging/overplanting, oversewing, damping-off, pre and post-establishment procedures, seed dormancy, certified seed, seed drill, cool-season grasses, warm-season grasses.

Resources:

Books

NTEWG	Certificate III Sports Turf Management Resource Workbook
Handrick and Black (2010)	Growing Media for Ornamental Plants and Turf (4 th Ed)

Certificate III in Sports Turf Management.**AHCTRF303 Implement a Grassed Area Maintenance Program**

Introduction:

This unit of competency covers the skills, knowledge and process required when implementing a grassed area maintenance program. This document focuses on a sports turf management program and defines the standard required to:

- determine the maintenance requirements for a sports area
- conduct a risk assessment for work in a sports area
- safely adjust and use turf maintenance machinery and equipment
- write a report on the maintenance program activities.

Industry recommends a minimum of 60 hours be allocated to deliver this unit of competency

Activities & Assessment:

1. **Turfgrass Quality:** Students gain an appreciation of turf quality by studying a range of surfaces and measuring pace, density, texture, mowing height and profile hardness and moisture. The effect of cultural practices on quality, safety and turf health are covered. It is expected that input from various Turf Managers experienced in the preparation of turf surfaces will be used.

Assessment by group practical exercises.

2. **Rules and Dimensions:** the basic rules (as they impact the Turf Manager's role) and dimensions of a range of sports played.

Assessment by assignment work.

3. **Preparation practicals:** at least three different natural turf surfaces select from the following: golf, bowls, cricket, football, tennis, horse racing are prepared for day to day play, including any necessary mowing, rolling, raking, watering, line marking or equipment setup. Surface quality is measured and related to the requirements of the players.

Assessment by group practical exercises.

4. **Maintenance Program:** students will prepare a maintenance program for at least three surfaces (eg: golf greens, golf fairways, bowling greens, racetrack, sportsfield) that provides basic details on mowing frequency and height, and requirements for irrigation, fertilising, plant growth regulators and renovation.

Assessment by written assignment.

Key Terms:

Cricket:

Return Crease, Popping Crease, Bowling Crease, Protected area, Pitch, Wicket Table, Fielding Positions, Stumps, bails, Boundary, Clegg Impact Hammer.

Golf:

Par, Collar, Out of Bounds, Apron, Ground Under Repair (GUR), Surrounds, Obstruction, Fairway, Divot
Carriageway, Plug mark, Rough, Stimpmeter, Tee Markers, Dew Whip, Course rating, Hole, Pin / Flag, Green, Casual Water, Tee, Lateral Water, Hazard

Bowls:

Green, Rink, Ditch, Mat, Jack- Kitty, Centre Line, Boundary Peg, Bowl, Bias, Jack Marker, Draw, Long End, Short End, Fast Green, Timing Ramp, Rink Number, Slow Green

Other:

Penetrometer, Thatch, turfgrass quality, density and texture, reel mowing, rotary mowing, renovation, aeration, compaction, dethatching.

Resources:

Books:

NTEWG	Certificate III Sports Turf Resource Book
J. B. Beard	Turf Management for Golf Courses, 1984
K Liffman	Bowling Greens – A Practical Guide, 1983
K Liffman	Sportsfields – A Practical Guide, 1985
K McIntyre & D McIntyre	Cricket Wickets – Science vs Fiction, 2001

Internet

http://www.toro.com.au/files/dimension/Sports_Field_Dimensions_V5.pdf

Introduction

This competency covers the application of principles and practices of turf renovation under limited supervision. Practical demonstration of renovation will be required on a variety of situations, on a range of different grasses and sports surfaces. Renovation may be a major exercise requiring the surface to be taken out of play, or could include less intrusive, ongoing procedures. The tasks require practical use of various pieces of equipment, so it can be done concurrently or after the main machinery operation competencies.

Industry recommends a minimum of 50 hours be allocated to deliver this unit of competency

Activities and Assessment:

- 1 Assess the soil profile:** the profile is tested for infiltration, layering, drainage problems and various other physical attributes to determine the type of renovation required. The site is also sampled for standard nutrient analysis, and a suitable amendment program devised. Check site and identify work health and safety hazards, assess risks and implement controls.

Assessment by demonstration and or classroom task/work sheet.

- 2 Devise a suitable renovation program:** a suitable renovation program is devised having regard to the turf species, required sports characteristics, the site use and play commitments, the physical and chemical attributes of the profile. The program includes understanding why materials are used in a renovation program (eg: topdressing material, pH amendments, fertiliser), and estimation of the quantities required.

Assessment by assignment based on either of sites in 4 or 5 below.

- 3 Assess renovation practices:** a study is made of the principles and practical implications of various renovation practices such as aeration, dethatching, dusting and levelling. The study includes information on the various pieces of equipment on the market and the role they play in the renovation program.

Assessment by assignment combining the elements of 1, 2, & 3 relevant to either sites in 4 or 5.

- 4 Renovate a fine turf surface (golf/bowling green/cricket wicket table):**
Includes the profile analysis, determination of a suitable renovation plan, as well as the practical tasks in implementing the renovation procedure. Calibration of all equipment and materials used to be recorded for future reference.

Assessment by practical demonstration/on campus practical/employer verification.

- 5 Renovate a coarse turf area (eg: sportsfield, lawn, fairway, tee):**
Includes the profile analysis, determination of a suitable renovation plan, as well as the practical tasks in implementing the renovation procedure. Calibration of all equipment and materials used to be recorded for future reference.

Assessment by practical demonstration/on campus practical/employer verification.

Key Terms:

Soils: Soil texture, Soil structure, Aggregation, Dispersion, Compaction, Infiltration rate, Drainage, Soil Textural Classification, Topsoil Amelioration, Liming Materials, Gypsum, Saturation, Waterlogging, Field Capacity, Aeration, Potassium, Available Water, Phosphorus, pH, Nitrogen, CEC, Organic matter, Sodic soils.

Grass Terminology: Cool season grass, Warm season grass, Turfgrass density, Turfgrass texture, Turfgrass uniformity, Monostand, Polystand, Thatch, Mat, Rootzone, Pre-germinated seed, Seed dormancy, Seed viability, Hydro seeding.

Machinery: Scarifier, Hollow tyne corer, Driller, Vertidrain, Hydroject, Topdresser.

Resources:

Books:

NTEWG	Certificate III Sports Turf Management Resource Workbook
Adams, W. A. and Gibbs, R. J	Natural Turf for Sport and Amenity: Science and Practice, CAB International, Cambridge, 1994
Aldous, David E.	International Turf Management Handbook Australia, Inkata Press 1999.
Beard, James B	Turf Management for Golf Courses Minneapolis, MN, Burgess Pub., Co., 1982
Beard, James B	Turfgrass Science and Culture. New Jersey. Prentice Hall. 1973. (Old book possibly not as current & imperial measures)
Daniel, William H.	Turf Managers Handbook Cleveland, Harvest, 1979.
Hope, Frank	Turf Culture: a complete manual for groundsmen. London, Blandford, 1978.
Kaapro, J.	Turf Nutrition and Fertilisers. Australian Turfgrass Research Institute. Sydney. 1994
Liffman	Sports Grounds and Turf Wickets A Practical 1986
Liffman	Bowling Greens: A practical guide 1986
Madison J H	Principles of Turfgrass Culture, N Y Prieger, 1983 (Repr of 1971 ed)

Internet

Toolbox, RTF3027A Renovate Sports Turf, } Online Toolboxes
Toolbox, RTF2019A Renovate Grassed Areas, }

<http://toolboxes.flexiblelearning.net.au/series4/408.htm>

Certificate III in Sports Turf Management.
AHCWHS301 Contribute to Work Health and Safety Processes

Introduction

This unit covers the processes of carrying out enterprise Work Health and Safety policies and procedures. It describes the skills and knowledge standard as required to:

Work in accordance with workplace procedures to:

- a. Implement hazard Identification and risk control.
- b. Carryout safe practices during work operations.
- c. Participate in arrangements for maintaining health and safety for all people in the workplace.

Industry recommends a minimum of 40 hours be allocated to deliver this unit of competency

Activities & Assessment:

1. **Work based report:** Discuss and research relevant aspects of codes of practice, regulations and the WHS Act as related to current workplace.

This should include:

- Workplace WHS policies and procedures,
- Employee and employer WHS responsibilities
- Emergency procedures.
- Hazard identification & risk control
- A workplace 'safety communication' plan and employee input/feedback procedure.
- Completed incident report

Assessment by report

2. **Issues Analysis:** Analyse four WHS case studies from the National Certificate III in Sports Turf Management Resource Workbook or similar, relating these to the WHS Act.

Assessment by completion of four individual worksheets/reports. One of these to be presented to a group of peers.

3. **Risk Assessment:** Audit a Sports Turf facility, conducting a basic workplace safety audit of the site.

Assessment by completion of a worksheet, including an audit and risk assessment.

4. **WHS Knowledge Evidence:** PPE selection and care, WHS legislation, role of codes of practice, emergency procedures, common safety signs and symbols, risk assessment process, manual handling, safe work systems.

Assessed by Closed book quiz

Key Terms:

Emergencies: electrocution, fire, flood, chemical spills, storms, gases in confined spaces, gas leaks, serious injury associated with tractors, machinery and equipment, animals, vehicles, firearms, and grain suffocation.

Hazards: operation and maintenance (including powered tools), vehicles, noise, chemicals, gases, dust, manual handling, solar radiation, animals, damaged or broken structures, damaged or worn equipment, items blocking exits, poor surfaces, spillage and breakage.

Manual handling: moving, lifting, shovelling, loading materials, pulling, pushing, up-ending materials, hand tool use, storing materials at heights too high or low, bending, repetitious tasks, handling animals and plants.

Personal Protective Equipment: ear, eye and chemical protection, protective clothing, sunscreen lotion, gloves, safety harness, headgear.

Miscellaneous: PTO accidents, chemical poisoning and environmental damage, tractor roll-over, skin protection, machinery practices in garden/turf, WHS Act and Regulations, Codes of Practice, audit, risk assessment, hazard policies and procedures, emergency policies and procedures, reporting procedures.

Resources:

NTEWG	Certificate III Sports Turf Management Resource Book
VGCSA	Turf Management Safety DVD

Internet:

Safe work Aust	www.safeworkaustralia.gov.au/sites/SWA
Workcover NSW	www.workcover.nsw.gov.au
Worksafe ACT	www.worksafe.act.gov.au/health_safety
Workcover QLD	www.worksafe.qld.gov.au
Worksafe Vic	www.worksafe.vic.gov.au/
Workcover Tas	www.workcover.tas.gov.au/
Worksage NT	www.worksafe.nt.gov.au
Worksafe SA	www.safework.sa.gov.au/
<u>APVMA</u>	<u>www.apvma.gov.au</u>
National WHS	<u>www.nasca.org.au</u>
Standards Australia	www.standards.org.au/Pages/default.aspx
Online videos	<u>www.vocam.com.au</u>

Certificate III in Sports Turf Management.
AHCCHM303 Prepare and Apply Chemicals

Introduction

This competency covers the process of preparing and applying chemicals. It requires knowledge of the chemicals related to the workplace, the hazards and risks involved in their use, and the specific safety procedures prescribed for working unsupervised. It requires the ability to handle and apply chemicals ensuring minimum risk to self, others and the environment, then accurately record their use.

This competency is the primary chemical use unit for training in Turf Management. It should be incorporated into the training program along with the unit “Transport and Store Chemicals” (AHCCHM304). This unit should where possible be taught in conjunction with the chemical use licensing requirements for the appropriate state.

It is an industry expectation that the initial training and assessment across these two units of competency will take a minimum of 20 contact hours. As this is a practical unit, industry does not accept that one can be deemed competent via online delivery.

Activities & Assessment:

1. **Determine the need for chemical use:** Identification of 30 Pests/Diseases/Weeds of turf to common name (cluster delivery). Assess the level of Pests/Diseases/Weeds infestation and the need for control as outlined in Integrated Pest Management Programs. Identify all control options available including non-chemical controls. Select the best chemical for control, taking into account risks, hazards, efficacy and legality.

Assessment by individual assignment work.

2. **Research appropriate chemical:** Chemical label and Safety Data Sheets are read and understood. Legislation applicable to the application of pesticides (national, state, WH&S) is understood and followed eg: registration of chemical. Hazards including environmental, WH&S, public, climatic and management are identified and assessed as part of chemical application. Chemical spills or accident and first aid procedures are followed in relation to chemical use and legislation.

Assessment by examination. Closed book

3. **Prepare to use chemicals:** Refer to label recommendations regarding application. Select appropriate personal protective equipment and application equipment. Consider weather forecasts and site weather conditions including taking measurements, and assessed prior to application of chemical.

Assessment by practical demonstration.

4. **Calibration:** A boom sprayer and a minimum of two other types of chemical application equipment (boom, knapsack, fish mouth nozzle, wick applicator, CDA, wands) are calibrated, including the calculation volumes from application rates on labels.

Assessment by practical demonstration.

5. **Apply chemicals:** Mixing and loading and then application of chemical is performed according to the label taking into consideration; any legal obligations, environmental issues sensitive areas and sensitive organisms and WH&S concerns. Special reference should be made to spray drift (droplet size and vapour) when calibrating and applying chemicals.

Assessment by practical demonstration.

6. **Clean up following chemical application:** Disposal of unused chemical according to the relevant legislation. Equipment is cleaned and/or decontaminated dependant on future use. Personal Protective Equipment is cleaned and serviced.

Assessment by practical demonstration.

7. **Record application details:** Chemical application is recorded according to legal requirements. This should include application records, incident/accident reports and store inventories.

Assessment by examination. Closed book

Key Terms

Safety Data Sheets (SDS), chemical label, dangerous goods classification, poison schedule, calibration, WH&S, registration, Wind, humidity, rain, chemical spills, poisoning, health checks, insecticides, fungicides, herbicides, bactericides, algacides, nematicides, Personal Protective Equipment, Integrated Pest Management, Drift, knapsacks, booms, CDA, wick applicators, respirators, spot spraying, face shields, nozzles, drift, Modes of action, with holding periods, re-entry period, drench., EPA management systems, Industry Code of Practice, Workcover guidelines, WH&S procedures, Spray application log book/diary, Cultural practices log book/diary, Chemical Applicators Licenses, Risk assessments.

Resources:

NTEWG	Certificate III Sports Turf Management Resource Workbook
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Internet

APVMA	www.apvma.gov.au
ChemCert	www.chemcert.org.au
SMARTrain	http://www.smartrain-publications.com
Auschem	http://www.auschemtraining.com.au/
Weeds Australia	www.weeds.org.au
SDS	www.msds.com.au
Pestgenie	www.pestgenie.com.au
Hort Tool Box	http://toolboxes.flexiblelearning.net.au/demosites/series6/605.htm
Silvan	www.silvanpumps.com.au
Teejet	www.teejet.com
Dept of Agriculture and Fisheries	https://www.daf.qld.gov.au/biosecurity/about-biosecurity/Biosecurity-Act-2014/overview-and-foundation-principles/general-biosecurity-obligation

Introduction

This unit of competence covers the process of transporting, handling and storing chemicals relating to a turf safely and without supervision in line with the WHS global harmonisation system. Upon completion the operator should be competent to a standard that minimises risks, avoiding spillage and accidents, whilst following correct procedures and regulations required for safety, in order to protect the health and safety of everyone in the workplace and demonstrate environmental responsibility when handling chemicals. It requires knowledge of the chemicals used in a Turf environment and the hazards involved in their handling and storage.

This competency is the primary chemical use unit for training in Turf Management. It should be incorporated into the training program along with the unit “Prepare and Apply Chemicals” (AHCCHM303). This unit should where possible be taught in conjunction with the chemical use licensing requirements for the appropriate state.

It is an industry expectation that the initial training and assessment across these two units of competency will take a minimum of 20 contact hours. As this is a practical unit, industry does not accept that one can be deemed competent via online delivery.

Activities & Assessment:

1. Transport chemicals:

Transport methods must be according to the label and the Safety Data Sheet (SDSs).

Assessment by label & SDS reading task sheet.

Hazard risk assessment for transport and handling are identified, including the need for personal protective equipment and where necessary the risks are minimised.

Assessment by written task sheet based on the label and MSDS.

A basic knowledge of the legislation and safe working procedures relating to transport of chemicals is followed, including control measures in the event of spills, an accident, injury or poisoning associated with transportation.

Assessment by written examination. Closed book

2. Store Chemicals in the workplace:

Storage methods are appropriate for the chemical as stated on the label and or SDS.

Assessment by label & SDS reading task sheet.

Storage area is evaluated to identify OHS hazards and control risks, including the prevention of entry by unauthorised people or animals and contamination of the environment. Safe working procedures and maintenance of the area are defined. The disposal of old chemicals is in line with legislation. .

Assessment by an assignment or observation, either based on the workplace or the specifications of a suitable sports turf scenario.

3. **Record storage details:** A chemical storage inventory is maintained as required by legislation. Records of poisoning or other WHS incidents are maintained.

Assessment can be by authenticated evidence of workplace documentation Storage manifest / inventory or by an assignment whereby the student designs and uses a recording system.

Key Terms:

Safety Data Sheets, Spill response kits, Bunding, Ventilation, Fire extinguishers, Hazard Risk assessment, cross contamination, chemical trespass, Personal Protective equipment, Acute poisoning, Chronic poisoning, Secondary poisoning, off-target damage, container legislation, emergency showers and eye wash, soil residues, wash down areas, rinse-ate, waste sumps, dispensing units.

Resources:

NTEWG	Certificate III Sports Turf Management Resource Workbook
Pesticide Application Manual	Qld Dept of Primary Industries
Sportsturf Protection Manual	AGCSA
AusChem Training (Vic) Inc	AgVet Chemicals User Course 11 th Edition 2012

Books

Internet

MSDS	www.msds.com.au
*GHS	http://www.unece.org/trans/danger/publi/ghs/ghs_rev03/03files_e.html
ChemClear	http://www.chemclear.com.au/
drumMUSTER	http://www.drummuster.com.au/
Dept of Agriculture and Fisheries	https://www.daf.qld.gov.au/biosecurity/about-biosecurity/Biosecurity-Act-2014/overview-and-foundation-principles/general-biosecurity-obligation

*Globally Harmonised System of Classification and Labeling of Chemicals (GHS)

Certificate III in Sports Turf Management
AHCDRG301 Install Drainage Systems

Introduction

This unit of competence covers the skills, knowledge and process of installing surface and /or sub surface drainage systems in sports turf scenarios. It requires an understanding of the basic principles of drainage, and the ability to interpret and implement drainage system plans using appropriate equipment.

Industry recommends a minimum of 30 hours be allocated to deliver this unit of competency

Activities & Assessment:**1. Assess the drainage requirement for an area:**

Drainage assessment includes measuring profile and subsoil Infiltration Rate, recording surface contours or interpreting an existing contour plan, assessing compaction and thatch levels and diagnosing the cause of poor drainage.

Assessment by group practical exercise.

2. Underpinning knowledge on drainage:

Students will study: the effects of poor drainage of the soil profile on turf health and surface quality; the process of water movement through soils; drainage systems and material types; potential environmental issues of drainage water.

Assessment by written test. Closed book

3. Case Studies:

Drainage problems are studied as case studies (eg: water table in a push-up green, poor surface drainage due to surface compaction or high clay content profile, excessive water retention in thatch etc.) The causes and drainage options (including various drainage materials) in each case are studied. In addition to this, students will be competent in the basic calculations associated with surface falls and levels.

Assessment by written test. Closed book

4. Prepare for drainage system installation:

Activities including WHS consideration, cost estimates, time schedules, equipment and machinery requirements, coordination of work, location of services, basic survey and mark-out.

Assessment by individual assignment.

5. Use surveying equipment:

Students will be competent in the use of the automatic level for basic surveying to record Relative Levels, distance and azimuth of features on a site of limited size.

Assessment by individual testing on competence with the automatic level, and individual mapping/contouring assignment.

6. Install a drainage system:

Students will work in a team to; set-out, excavation and earthworks required; install pipework, cleanup site and any other tasks required to complete the drainage project.

Assessment by group practical work.

Assessment Details:

1. Written Assessment covering the following:

Knowledge Evidence

- principles and practices of drainage installation
- drain types, components and installation techniques
- soil characteristics and their impact on drainage systems
- purposes of drainage systems and the application of drainage system plans to the physical situation
- work health and safety

2. Practical's / Worksheets covering the following

Performance Evidence

- install drainage system works
- interpret drainage system plans and drawings
- interpret site specifications, soil types and drainage system plans
- level and align earthworks
- measure materials required to install drainage systems
- prepare for installation activities
- set out drainage system works
- set out, survey, test and excavate the installation site
- test the drainage system
- use equipment, tools and machinery appropriate to the scope of works

Key Terms:

Saturation, Field capacity, Compaction, Porosity, Infiltration rate, Percolation rate, Moisture retention, Water table, Black layer, Anaerobic, Thatch, Surface drainage, Sand slit drainage, Perched water table, Flow rates, Permeability

Resources:

Books:

NTEWG	Certificate III Sports Turf Management Resource Workbook
K.Handrek; N.Black	Growing Media for Ornamental Plants & Turf, 2002
K.McIntyre; B.Jakobsen	Drainage for Sports Turf & Horticulture, 1998
K.McIntyre; B.Jakobsen	Cricket Wickets Science v Fiction, 2001
K.McIntyre	Problem Solving for Golf Courses, The Landscape, Sports Grounds and Race Courses, 2004
K.McIntyre; M Parker; D Warwick	How to Build a Sand Based Golf Green, 2007
S.W. Baker	Sands for Sports Turf Construction and Maintenance. UK

Certificate III in Sports Turf Management.
AHCSOL401 Sample Soils and Interpret results

Introduction

This competency covers the process of carrying out soil sampling and interpretation of results of soil analysis. The sampling may be for the analysis of physical, chemical or biological properties. The analysis of the soil maybe performed on or off site by the person taking the sample or by a soil consultant.

Industry recommends a minimum of 50 hours be allocated to deliver this unit of competency

Activities and Assessment:

- 1 **Prepare for sampling:** Soil/Tissue sampling method is selected based on type of soil/tissue test and size of area, to ensure it is representative. Appropriate soil/tissue sampling tools are selected. Underground services are located to eliminate damage and danger to the individual.

Assessment by practical demonstration.

- 2 **Perform sampling procedure:** Samples are taken to appropriate depth and number per area/volume of soil. (ideally from individual workplaces) Samples are prepared and appropriately labelled for future testing.

Assessment by practical demonstration.

- 3 **Carry out soil testing procedures:** Practical demonstration of feel test, jar test, sieve analysis, organic matter test, soil moisture holding, compaction, infiltration rates, PH and salinity testing.

Assessment by practical demonstration and worksheets

- 4 **Interpret results:** Results of analysis are understood and can be compared to published data. Interpretation and recommendations from soil consultants are evaluated and understood.

Assessment by written test Closed book

Key Terms

Soils: Soil texture, Soil structure, Aggregation, Dispersion, Moisture retention, Compaction, Infiltration rate, Drainage, Sub-surface drainage, Clay soil, Loamy soil, Sandy soil, Soil Textural Classification, Topsoil Amelioration, Liming materials, Gypsum, Particle size analysis (mechanical sieve analysis), Saturation, Waterlogging, Field Capacity, Aeration, Potassium, Wilting Point, Oven Dry, Capillary Pores, Non-capillary pores, Hygroscopic Water, Available Water, Phosphorus, pH, Nitrogen, CEC, EC, Nematodes, Black Layer.

Tools: Hole changer, core sampler, soil profiler, auger, sampling tube.

Sampling methodology: Random, representative, sub-sample.

Resources:**Books**

NTEWG	Certificate III Sports Turf Management Resource Workbook
Handreck, K & Black, N.	Growing Media for Ornamental Plants and Turf,. 2002
Kaapro, J.	Turf Nutrition and Fertilizers. 1994
McIntyre, K & Jakobsen, B	Drainage for sports turf and Horticulture. 1998

Certificate III in Sports Turf Management.**AHCSOL303 Implement Soil Improvements for Garden and Turf Areas**

Introduction

This unit of competency describes the skills and knowledge required to provide information about and determine its suitability for sports, recreational and open space turf areas and determine ameliorants or additives to improve it.

Industry recommends a minimum of 30 hours be allocated to deliver this unit of competency

Activities & Assessment:

1. Prepare and collect soil samples for testing: Students are required to:

- Outline the reasons for testing soils
- Prepare tools and materials for collecting soils and to avoid contamination.
- Take soil samples on a minimum of three different sites / soils in a random pattern, according to industry standards
- Label soil samples according to industry guidelines
- Record sampling details

Assessment by Practical Demonstration and Written Assessment

2. Determine physical characteristics of sample: Students are required to:

- Measure the depth of topsoil and determine if sufficient for the requirements of the plants to be installed
- Determine texture and structure of the samples
- Determine soil colour and the presence of organic matter
- Determine characteristics of soil profile where required
- Determine the ability of soil to drain or retain water
- Assess the physical characteristics of soil and determine improvements needed

Assessment by Practical Demonstration and Written Assessment

3. Determine chemical characteristics of sample: Students are required to:

- Conduct tests for pH and salinity
- Determine the suitability of soil for particular plants
- Determine the soil's fertility and the need for additional fertiliser or other amendments
- Determine the chemical characteristics of soil and improvements needed

Assessment by Practical Demonstration and Written Assessment

4 Prepare soils for planting or replanting: Students are required to determine how to:

- Improve physical characteristics of turf areas as required
- Adjust pH and salinity of soil in turf areas as required
- Incorporate additional soil as needed to establish final levels
- Finish soil level and consolidate ready for planting according to planting plans and enterprise procedures

Assessment by Closed book knowledge test and open book application test

Key Terms:

Physical characteristics of soils: Soil Sampling and Testing, Soil Texture and Structure, Organic Matter, Soil Colour, Topsoil, Drainage, Field Capacity, Wilting Point, Permanent Wilting Point, Water Retention Infiltration, Percolation.

Chemical characteristics of soils: Cations Anions, Cation Exchange Capacity, Soil pH, Agricultural Lime, Dolomite, Elementary Sulphur, Soil Salinity, Electrical Conductivity, Carbonates, Nutrients, Fertilisers.

Biological properties of soils: macro-organisms, micro organisms, mulch, leaf litter.

Tools: Hole changer, soil auger, soil probe, sampling tube, pH Kit, Soil pH meter, Soil Salinity (Electronic Conductivity) meter, sampling bags, distilled water.

Resources:

Kaapro, J	Turf Nutrition and Fertilisers 1994.
Black Neil, Hendrick, K	Growing Media for Ornamental Plants and Turf, 2002
McIntyre, K, & Jakobsen, B	Drainage for Sports Turf and Horticulture 1998

Certificate III in Sports Turf Management.
AHCWRK309 Apply Environmentally Sustainable Work Practices

Introduction

This unit of competency describes the skills and knowledge required to apply environmentally sustainable work practices.

This unit applies to individuals who work under broad direction and take responsibility for their own work including limited responsibility for the work of others.

Work routines meet organisational and compliance requirements for ethical handling and welfare of animals. Environmental sustainability, work health and safety and biosecurity appropriate to the work role.

Industry recommends a minimum of 30 hours be allocated to deliver this unit of competency

Activities & Assessment:

1. **Case studies of environmentally sustainable work practices:** Identify a range of current practices in relation to resource usage and sustainability, including; contamination, nutrient pollution, noxious/invasive plants and animals, habitat destruction, pollution from wash-down bays, noise pollution, use of recycled water.

Assessment by: Assignment/report on students workplace or a given site/scenario.

2. **Current Environmental Practices:** Contribute to the review of workplace environmental sustainability practices. Case studies of good environmental practices within a sports turf environment.

Incident Demonstration: A group exercise involving an accidental release/spill of an environmentally damaging substance to be undertaken.

Assessment by: group participation and class work sheets.

3. **Apply improvement strategies:** Research and identify what methods and tools can be used in improving environmental efficiencies, this should include life cycle management principles. **Develop strategies** to minimise waste, employ recycling and re-use where appropriate.

Assessment by: group participation and class work sheets.

4. **Record and report:** Ongoing environmental recording of sustainable practices in the student's workplace, should include suggestions on improvements or new initiatives that could be developed. Students are encouraged to include measures such as cutting heights, machinery maintenance, chemical spray/fertiliser records, non-potable water use and recycling.

Assessment by: individual project examining workplace records, resource efficiency and environmental targets and class presentation on said workplace including positive measures being undertaken and or proposed.

Key Terms:

Environmental Policies: Waste minimisation and management, sustainability, weed and pest management, protection of land and habitat and the conservation of resources, energy use, greenhouse gas emissions, use of chemicals, and plant and equipment.

Environmental Risks and Hazards: spills, spill kits, leaks, pollution, planned and unplanned emissions, soil compaction, disturbance and erosion, accidents and disposal of waste, fire risks and threats., inappropriate human interaction on the environment and damage to habitat resources.

Environmental Issues: Sustainability, reduction and disposal of waste, water quality, energy efficiency, biodiversity and habitat protection, conservation of natural resources, air quality, land contamination, noise, soil and salinity management, and fire management.

Resources:**Books:**

Environmental Protection Agency	Guidelines Improving Environmental Management (NSW)
Environmental Protection Agency	Guidelines Improving Eco Efficiency of Golf Courses (QLD)
Environmental Protection Agency	Guidelines Safe Effluent Usage

Internet

Envirolink	http://www.envirolink.org/
Environmental Portal (Australia)	http://kaos.erin.gov.au/index.html
Dept of Environment and Heritage	http://www.deh.gov.au/index.html
EPA- Australia- State websites	www.epa.tas.gov.au/
	www.epa.vic.gov.au/
	www.epa.sa.gov.au/
	www.epa.nsw.gov.au/
	www.epa.wa.gov.au/
	www.epa.nt.gov.au/
	www.environmentact.gov.au
	www.derm.qld.gov.au/
US Environmental Protection Agency	http://www.epa.gov/