

Modification history

Release	Comments
Release 2	This version released with AHC Agriculture, Horticulture, Conservation and Land Management Training Package Version 4.0.
Release 1	This version released with AHC Agriculture, Horticulture, Conservation and Land Management Training Package Version 1.0.

AHCDRG501	Design drainage systems
Application	<p>This unit of competency describes the skills and knowledge required to identify design requirements, determine specifications, capital expense and operating expense budgets and design the drainage system.</p> <p>The unit applies to individuals who apply specialised skills and knowledge to the design of drainage systems, and take personal responsibility and exercise autonomy in undertaking complex work. They analyse and synthesise information and analyse, design and communicate solutions to sometimes complex problems.</p> <p>No occupational licensing, legislative or certification requirements apply to this unit at the time of publication.</p>
Prerequisite Unit	Nil
Unit Sector	Drainage (DRG)

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
1. Determine design requirements	1.1 Determine water transfer, recharge, reuse and harvesting system needs 1.2 Describe processes of collecting, disposing and storing drainage water to avoid degrading water quality 1.3 Investigate regional geology and geography to predict drainage parameters 1.4 Apply hydrological calculations to predict volumes and rates of surface run-off 1.5 Conduct site investigations to assess depth of clay, depth of ground water, soil and water salinity, and structural or chemical impediments 1.6 Determine the most cost effective drainage system 1.7 Document predictions of leaching fractions and salt movements, and develop soil amelioration and drainage management plans 1.8 Determine the need for leachate interception and dewatering system and if required prepare construction specification for interception and collection, disposal, reuse or recycle 1.9 Confirm drains and structures are capable of carrying the design water volumes and intensities according to workplace standards 1.10 Identify construction specifications required to make drainage systems according to environmental and workplace health and safety requirements 1.11 Identify and protect environmentally sensitive areas according to local, state and federal legislation and regulations

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
2. Design a drainage system	2.1 Select systems, including relevant equipment, to move water efficiently to water storage or treatment and at the flow and pressure required in design specifications 2.2 Select system combinations that are efficient, reliable, functional, serviceable and flexible for the intended application 2.3 Determine energy requirements and check layout of electricity lines with local authority if electrical pumps and motors are used in the system 2.4 Select and integrate structures, pipes, valves and accessories into a functional system that can be monitored and maintained 2.5 Define the work required to make suitable drainage systems available to the workplace in the design specifications 2.6 Confirm power supply design specification with power authorities if electrical pumps and motors are used in the system 2.7 Minimise drainage system design damage 2.8 Document drainage system design 2.9 Confirm design output with an appropriately experienced and qualified person
3. Determine capital expense budget	3.1 Estimate materials required from plans and specifications 3.2 Estimate labour requirements based on documented work schedule with reasonable allowance for variances in work schedules 3.3 Base costing for each component on quoted information from suppliers, or sound analysis of individual elements 3.4 Document design calculations, performance indicators and decisions and relevant information in plans, specifications and manuals 3.5 Document capital expense budget 3.6 Confirm capital expense budget output with an appropriately experienced and qualified person
4. Determine operating expense budget	4.1 Optimise the relationship between capital and operational costs including a comparison of energy sources 4.2 Collate all operating expense applicable to the completed drainage system and calculate an operating expense budget 4.3 Document operating expense budget

Foundation Skills	
<i>This section describes those language, literacy, numeracy and employment skills that are essential for performance in this unit of competency but are not explicit in the performance criteria.</i>	
Skill	Description
Reading	<ul style="list-style-type: none"> Identify and interpret information regarding design requirements for drainage systems Interpret regional geology and geography information related to drainage system design Identify environmentally sensitive areas according to local, state and federal legislation and regulations
Writing	<ul style="list-style-type: none"> Develop soil amelioration and drainage management plans Document drainage system design, plans, specifications and manuals Document capital and operating expense budgets
Oral communication	<ul style="list-style-type: none"> Initiate discussions with local authorities, using clear language to communicate energy requirements and check layout of electricity lines, and confirm power supply design specification with power authorities Use clear communications with appropriately experienced and qualified person to discuss design output and capital expense budget outputs
Numeracy	<ul style="list-style-type: none"> Calculate water transfer, recharge, reuse, harvesting system needs and drainage parameters Use hydrological calculations to predict volumes and rates of surface run-off Record and use site investigations data to determine the most cost effective drainage system Estimate and record leaching fractions and salt movements Calculate and record drain and structure capacity and confirm that it meets water volumes, flow, pressure and intensity design requirements Calculate drainage system design energy requirements and water use and compare to industry benchmarks Estimate materials and labour costs and document in capital expense budget Calculate and document an operating expense budget
Navigate the world of work	<ul style="list-style-type: none"> Identify and describe own workplace requirements, including safety requirements, associated with own role and area of responsibility

Unit Mapping Information			
Code and title current version	Code and title previous version	Comments	Equivalence status
AHCDRG501 Design drainage systems Release 2	AHCDRG501 Design drainage systems Release 1	Minor changes to performance criteria and foundation skills	Equivalent unit

Links	Companion Volumes, including Implementation Guides, are available at VETNet: https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72
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TITLE	Assessment requirements for AHCDRG501 Design drainage systems
Performance Evidence	
<p>An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit.</p> <p>There must be evidence that the individual has designed drainage systems on at least one occasion and has:</p> <ul style="list-style-type: none"> • assessed the requirements for pumping capacity in a drainage system and power requirements • completed hydrological calculations • developed capital and operating budgets • developed specifications for water transfer, recharge, reuse and harvesting systems • identified adverse environmental impacts of drainage and appropriate remedial action • identified design requirements • identified performance indicators for the drainage system • predicted volumes and rates of surface run-off and system leakage. 	
Knowledge Evidence	
<p>An individual must be able to demonstrate the knowledge required to perform the tasks outlined in the elements and performance criteria of this unit. This includes knowledge of:</p> <ul style="list-style-type: none"> • principles and practices of drainage design <ul style="list-style-type: none"> • developments in drainage technology • leachate interception and dewatering systems • leaching fractions and salt movements prediction • monitoring systems • the design processes • water transfer, recharge, reuse and harvesting systems • budgeting, contract development and obligations • cost/benefit analysis • local, state and federal workplace health and safety and environmental protection legislation, regulations, codes of practice and workplace requirements applicable to drainage system design. 	
Assessment Conditions	
<p>Assessment of skills must take place under the following conditions:</p> <ul style="list-style-type: none"> • physical conditions: <ul style="list-style-type: none"> • a workplace setting or an environment that accurately represents workplace conditions • resources, equipment and materials: <ul style="list-style-type: none"> • regional geology and geography information • drainage system site • drainage system water and soil testing equipment and procedures • local, state and federal workplace health and safety and environmental protection legislation, regulations, codes of practice and workplace requirements applicable to drainage system design • specifications: <ul style="list-style-type: none"> • industry energy and water efficiency benchmarks • timeframes: <ul style="list-style-type: none"> • according to the job requirements. <p>Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.</p>	
Links	<p>Companion Volumes, including Implementation Guides, are available at VETNet: https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72</p>