

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.

AHCIRG503	Design irrigation, drainage and water treatment systems
Application	<p>This unit of competency describes the skills and knowledge required to identify design requirements, determine specifications, define pumping and power system requirements, determine capital expense and operating expense budgets and design drainage and water treatment systems.</p> <p>The unit applies to individuals who apply specialised skills and knowledge to the design of irrigation, drainage and water treatment 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	Irrigation (IRG)

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 Analyse water quantity and quality needs for a particular crop or situation so that an estimation can be made for sufficiency and timeliness 1.2 Evaluate water transfer, recharge, reuse and harvesting systems 1.3 Determine water collecting and storing processes that do not degrade the water quality 1.4 Determine construction specifications that satisfy organisational and regulatory requirements 1.5 Investigate regional geology and geography to predict irrigation, drainage, storage and treatment system parameters 1.6 Conduct a site investigation to assess type of soil, depth of soil, depth of ground water, soil and water salinity, and structural or chemical impediments 1.7 Determine the most cost effective irrigation, drainage, treatment and storage systems 1.8 Document design calculations and decisions 1.9 Identify and protect environmentally sensitive areas according to local, state and federal legislation and regulations
2. Define pumping and power systems	2.1 Identify pumps that can deliver water efficiently when needed, from the water storage at the flow and at the pressure required to operate the distribution system to the design specifications 2.2 Select pump motor combinations that are efficient, reliable, functional, serviceable and flexible for the intended application 2.3 Determine energy requirements and layout of electricity lines and check with local authorities 2.4 Optimise the relationship between capital and operational costs including a comparison of energy sources 2.5 Document performance indicators, design calculations and decisions 2.6 Design construction specifications that define work required to make suitable pumping and power systems available

Elements	Performance Criteria
<i>Elements describe the essential outcomes.</i>	<i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>
3. Design an irrigation distribution system	3.1 Investigate regional geology and geography so that a prediction can be made on the sustainability of irrigation 3.2 Evaluate distribution systems and design with respect to a range of key variables 3.3 Size pipes, valves and fittings according to design system specifications so that capital cost is balanced against operation costs over the anticipated system life 3.4 Calculate and document flows, water levels and pressures so that they are within the acceptable tolerances for optimum performance 3.5 Include mechanisms for controlling and adjusting pressure and confirm isolation valves to direct water to areas with different irrigation schedules 3.6 Design distribution and monitoring systems to meet industry recommendations and calculate distribution system flow and velocity 3.7 Design construction plans and specifications that define the work required to achieve the required standards of uniformity and efficiency of water application 3.8 Document irrigation distribution system design
4. Design a drainage, storage and treatment system	4.1 Document predictions of leaching fractions and salt movements and develop soil amelioration and drainage management plans 4.2 Determine the need for leachate interception and dewatering system, and if required, prepare construction specifications for interception and collection, water treatment, disposal and reuse or recycle 4.3 Design drainage, storage and treatment systems to meet industry recommendations and calculate distribution system flow and velocity 4.4 Produce construction plans and specifications that define the work required to achieve standards of uniformity and efficiency of the drainage, storage and treatment systems 4.5 Determine if drains and structures are capable of carrying the design water volumes and intensities 4.6 Minimise drainage, storage and treatment system design damage 4.7 Use hydrological calculations to predict volumes and rates of surface run-off 4.8 Document drainage, storage, and treatment system design
5. Determine capital expense budget	5.1 Document design calculations and decisions and communicate relevant information through plans, specifications and manuals 5.2 Determine and document materials requirements from plans and specifications 5.3 Estimate labour requirements based upon documented work schedule with reasonable allowance for variances in work schedules 5.4 Base costing attributed to each component on quoted information from suppliers, or sound analysis of individual elements 5.5 Document capital expense budget 5.6 Confirm capital expense budget output with an appropriately experienced and qualified person
6. Determine operating expense budget	6.1 Calculate an operating expense budget that includes all expenses applicable to the completed irrigation, drainage, storage and treatment systems 6.2 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 irrigation, drainage and water treatment systems Interpret regional geology and geography information related to irrigation, drainage and water treatment systems design Identify environmentally sensitive areas according to local, state and federal legislation and regulations
Writing	<ul style="list-style-type: none"> Document performance indicators, design calculations and decisions Document construction plans and specifications Develop and document irrigation distribution system design Develop and document drainage, storage, and treatment system design 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, flows, levels and pressures and drainage parameters Use hydrological calculations to predict irrigation, drainage, storage and treatment system parameters Record and use site investigations data to determine the most cost effective irrigation, drainage, treatment and storage systems Estimate and record leaching fractions and salt movements Calculate distribution flow and velocity Record drain and structure capacity and confirm that it meets water volumes, flow, pressure and intensity design requirements 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
AHCIRG503 Design irrigation, drainage and water treatment systems Release 2	AHCIRG503 Design irrigation, drainage and water treatment 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	

TITLE	Assessment requirements for AHCIRG503 Design irrigation, drainage and water treatment 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 irrigation, drainage and water treatment systems on at least one occasion and has:</p> <ul style="list-style-type: none"> • collected and analysed information • compared costings • developed budgets • developed system specifications • documented outcomes • identified adverse environmental impacts of irrigation, drainage, water treatment and storage activities and taken appropriate remedial action • identified system design requirements. 	
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"> • contractual development and obligations • control and monitoring systems • cost/benefit analysis • design processes • developments in irrigation, drainage, storage and treatment technology • environmental impacts of irrigation, drainage and water treatment • soil types and their impact on the systems • workplace health and safety and environmental protection legislation and regulations, codes of practice and workplace policies and procedures. 	
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 • irrigation, drainage and water treatment system sites • irrigation, drainage and water treatment 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 irrigation, drainage and water treatment system design • relationships: <ul style="list-style-type: none"> • local authorities, appropriately experience and qualified person • 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>