



**Australian Government**

# **AHCIRG503 Design irrigation, drainage and water treatment systems**

**Release: 1**

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## Modification History

| Release Number | TP Version | Comments        |
|----------------|------------|-----------------|
| 1              | AHCv1.0    | Initial release |

## Application

This unit of competency describes the skills and knowledge required to design irrigation, draining and water treatment systems.

It applies to individuals who analyse information and exercise judgement to complete a range of skilled activities and demonstrate deep knowledge in a specific technical area. They have accountability for the work of others and analyse, design and communicate solutions to a range of complex problems. 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.

## Pre-requisite Unit

Nil.

## Unit Sector

Irrigation (IRG)

## Elements and Performance Criteria

| Element                                   | Performance criteria                                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Elements describe the essential outcomes. | Performance criteria describe the performance needed to demonstrate achievement of the element.                                                                                                                                                                                                                                                                                                |
| 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<br>1.2 Evaluate water transfer, recharge, reuse and harvesting systems<br>1.3 Determine water collecting and storing processes that do not degrade the water quality<br>1.4 Determine construction specifications that satisfy organisational |

| Element                                     | Performance criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|---------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                             | <p>and regulatory requirements</p> <p>1.5 Identify and protect environmentally sensitive areas as required by local, State and National legislation</p> <p>1.6 Investigate regional geology and geography so that a prediction can be made on the sustainability of irrigation, drainage, storage and treatment system</p> <p>1.7 Conduct a site investigation to assess type of soil, depth of soil, depth of ground water, water salinity, and structural or chemical impediments and to determine the most cost effective irrigation, drainage, treatment and storage systems</p> <p>1.8 Document design calculations and decisions</p>                                                                                                                                                                                                                                                                                                                                                               |
| 2. Define pumping and power systems         | <p>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</p> <p>2.2 Select pump motor combinations that are efficient, reliable, functional, serviceable and flexible for the intended application</p> <p>2.3 Determine energy requirements and layout of electricity lines and check with local authorities</p> <p>2.4 Optimise the relationship between capital and operational costs including a comparison of energy sources</p> <p>2.5 Document performance indicators, design calculations and decisions</p> <p>2.6 Design construction specifications that define work required to make suitable pumping and power systems available</p>                                                                                                                                                                                                             |
| 3. Design an irrigation distribution system | <p>3.1 Investigate regional geology and geography so that a prediction can be made on the sustainability of irrigation</p> <p>3.2 Evaluate distribution systems and design with respect to a range of key variables</p> <p>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</p> <p>3.4 Calculate and document flows, water levels and pressures so that they are within the acceptable tolerances for optimum performance</p> <p>3.5 Include mechanisms for controlling and adjusting pressure and confirm isolation valves to direct water to areas with different irrigation schedules</p> <p>3.6 Design distribution and monitoring systems to meet industry recommendations and calculate distribution system flow and velocity</p> <p>3.7 Design construction plans and specifications that define the work required to achieve the required standards of uniformity and</p> |

| Element                                            | Performance criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                    | efficiency of water application                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| 4. Design a drainage, storage and treatment system | <p>4.1 Document predictions of leaching fractions and salt movements and develop soil amelioration and drainage management plans</p> <p>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</p> <p>4.3 Design drainage, storage and treatment systems to meet industry recommendations and calculate distribution system flow and velocity</p> <p>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</p> <p>4.5 Determine if drains and structures are capable of carrying the design water volumes and intensities</p> <p>4.6 Minimise damage from drainage, storage and treatment system issues</p> <p>4.7 Use hydrological calculations to predict volumes and rates of surface run-off</p> |
| 5. Determine capital expense budget                | <p>5.1 Document design calculations and decisions and communicate relevant information through plans, specifications and manuals</p> <p>5.2 Determine and document materials requirements from plans and specifications</p> <p>5.3 Estimate labour requirements based upon documented work schedule with reasonable allowance for variances in work schedules</p> <p>5.4 Base costing attributed to each component on quoted information from suppliers, or sound analysis of individual elements</p> <p>5.5 Confirm budget output by checking with an appropriately experienced and qualified person</p>                                                                                                                                                                                                                                                                                                                                                                             |
| 6. Determine operating expense budget              | <p>6.1 Determine an operating expense budget that includes all expenses applicable to the completed irrigation, drainage, storage and treatment systems</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

## Foundation Skills

Foundation Skills essential to performance are explicit in the performance criteria of this unit of competency.

## **Range of Conditions**

## **Unit Mapping Information**

This unit is equivalent to AHCIRG503A Design irrigation, drainage and water treatment systems.

## **Links**

Companion Volume implementation guides are found in VETNet -

<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72>