



**Australian Government**

# **AHCIRG506 Design irrigation systems**

**Release: 1**

# AHCIRG506 Design irrigation systems

## Modification History

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

## Application

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 irrigation systems.

The unit applies to individuals who apply specialised skills and knowledge to the design of irrigation 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.

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

## Pre-requisite Unit

Nil

## Unit Sector

Irrigation (IRG)

## Elements and Performance Criteria

| 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<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 |

| Elements                                         | Performance Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|--------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i> | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|                                                  | <p>1.4 Determine construction specifications that satisfy organisational and regulatory requirements</p> <p>1.5 Investigate regional geology and geography to predict irrigation system parameters</p> <p>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</p> <p>1.7 Determine the most cost effective irrigation system</p> <p>1.8 Document design calculations and decisions</p> <p>1.9 Identify and protect environmentally sensitive areas according to local, state and federal legislation and regulations</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</p>                                                                                               |

| Elements                                         | Performance Criteria                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
|--------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <i>Elements describe the essential outcomes.</i> | <i>Performance criteria describe the performance needed to demonstrate achievement of the element.</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
|                                                  | irrigation schedules<br>3.6 Design distribution and monitoring systems to meet industry recommendations and calculate distribution system flow and velocity<br>3.7 Design construction plans and specifications that define the work required to achieve the required standards of uniformity and efficiency of water application<br>3.8 Document irrigation distribution system design                                                                                                                                                                                                                                       |
| 4. Determine capital expense budget              | 4.1 Document design calculations and decisions and communicate relevant information through plans, specifications and manuals<br>4.2 Determine and document materials requirements from plans and specifications<br>4.3 Estimate labour requirements based upon documented work schedule with reasonable allowance for variances in work schedules<br>4.4 Base costing attributed to each component on quoted information from suppliers, or sound analysis of individual elements<br>4.5 Document capital expense budget<br>4.6 Confirm capital expense budget output with an appropriately experienced and qualified person |
| 5. Determine operating expense budget            | 5.1 Calculate an operating expense budget that includes all expenses applicable to the completed irrigation system<br>5.2 Document operating expense budget                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |

## Foundation Skills

*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.*

| Skill              | Description                                                                                                                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Reading            | <ul style="list-style-type: none"> <li>Identify and interpret information regarding design requirements for irrigation system, including regional geology and geography information and environmentally sensitive areas</li> </ul> |
| Oral communication | <ul style="list-style-type: none"> <li>Initiate discussions with local authorities, using clear language to communicate energy requirements and check layout of electricity</li> </ul>                                             |

| Skill                      | Description                                                                                                                                                                                                                                                                    |
|----------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                            | <ul style="list-style-type: none"><li>lines, and confirm power supply design specification with power authorities</li><li>• Use clear communications with appropriately experienced and qualified person to discuss design output and capital expense budget outputs</li></ul> |
| Numeracy                   | <ul style="list-style-type: none"><li>• Use site investigations data to determine the most cost-effective irrigation system</li></ul>                                                                                                                                          |
| Navigate the world of work | <ul style="list-style-type: none"><li>• Identify and describe own workplace requirements, including safety requirements, associated with own role and area of responsibility</li></ul>                                                                                         |

## Unit Mapping Information

| Code and title current version         | Code and title previous version                                      | Comments                                                                                                      | Equivalence status |
|----------------------------------------|----------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------|--------------------|
| AHCIRG506<br>Design irrigation systems | AHCIRG503<br>Design irrigation, drainage and water treatment systems | Title updated<br>Performance criteria clarified<br>Foundation skills added<br>Assessment requirements updated | No equivalent unit |

## Links

Companion Volumes, including Implementation Guides, are available at VETNet: -  
<https://vetnet.gov.au/Pages/TrainingDocs.aspx?q=c6399549-9c62-4a5e-bf1a-524b2322cf72>

# Assessment Requirements for AHCIRG506 Design irrigation systems

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## Performance Evidence

An individual demonstrating competency must satisfy all of the elements and performance criteria in this unit. There must be evidence that the individual has designed an irrigation system on at least one occasion and has:

- collected and analysed information for the design
- compared costings
- developed system specifications
- documented outcomes
- identified system design requirements
- identified adverse environmental impacts of irrigation activities and taken appropriate remedial action
- developed budgets.

## Knowledge Evidence

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:

- developments in irrigation technology
- workplace health and safety and environmental protection legislation and regulations, codes of practice and workplace policies and procedures relevant for the irrigation system design
- soil types and their impact on the systems
- design processes
- environmental impacts of irrigation systems
- control and monitoring systems
- cost/benefit analysis.

## Assessment Conditions

Assessment of skills must take place under the following conditions:

- physical conditions:
  - a workplace setting or an environment that accurately represents workplace conditions
- resources, equipment and materials:
  - regional geology and geography information
  - irrigation system sites
- specifications:
  - irrigation 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 system design
- relationships:
  - local authorities, appropriately experienced and qualified person
- timeframes:
  - according to the job requirements.

Assessors of this unit must satisfy the requirements for assessors in applicable vocational education and training legislation, frameworks and/or standards.

## Links

Companion Volumes, including Implementation Guides, are available at VETNet: -  
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