



**Australian Government**

**Department of Education, Employment and Workplace Relations**

# **AHCDRG501A Design drainage systems**

**Release: 1**

## AHCDRG501A Design drainage systems

### Modification History

Not Applicable

### Unit Descriptor

<b>Unit descriptor</b>	This unit covers the process of identifying design requirements, determining specifications for drainage systems, and designing drainage systems and defines the standard required to: develop specifications for water transfer, recharge, reuse and harvesting systems; assess the requirements for pumping capacity in a drainage system and power requirements; identify performance indicators for the drainage system; predict volumes and rates of surface run-off and system leakage; design a drainage system that factors in the characteristics of the irrigated landscape and soil.
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### Application of the Unit

<b>Application of the unit</b>	This unit applies to enterprise managers and technical design personnel who identify design requirements, determine specifications for drainage systems and design drainage systems.
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### Licensing/Regulatory Information

Not Applicable

### Pre-Requisites

<b>Prerequisite units</b>		

## Employability Skills Information

<b>Employability skills</b>	This unit contains employability skills.
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## Elements and Performance Criteria Pre-Content

Not Applicable

## Elements and Performance Criteria

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>

<b>ELEMENT</b>	<b>PERFORMANCE CRITERIA</b>
1. Determine design requirements	<p>1.1. Water transfer, recharge, reuse and harvesting systems are designed to conserve natural resources.</p> <p>1.2. The process of collecting or storing water does not degrade the water quality for the enterprise or the environment.</p> <p>1.3. Construction specifications define the work required to make suitable water available to the enterprise in accordance with environmental and Occupational Health and Safety (OHS) requirements.</p> <p>1.4. Environmentally sensitive areas are identified and protected according to local, State and National legislation.</p> <p>1.5. Design calculations and decisions are documented to enterprise requirements.</p>
2. Define pumping and power systems	<p>2.1. Pumps are selected to move water efficiently when needed to water storage or treatment, at the flow and pressure required to design specifications.</p> <p>2.2. The pump motor combinations are efficient, and the pumps are reliable, functional, serviceable and flexible for the intended application.</p> <p>2.3. Energy requirements are determined, and layout of electricity lines are determined and checked with local authority.</p> <p>2.4. The relationship between capital and operational costs are optimised including a comparison of energy sources.</p> <p>2.5. Structures, valves and accessories are selected and integrated into a functional system that can be monitored and maintained according to enterprise guidelines.</p> <p>2.6. Performance indicators, design calculations and decisions are documented according to enterprise guidelines.</p> <p>2.7. Construction specifications define work required to make suitable pumping and power system available to enterprise.</p> <p>2.8. Power supply design specification is checked with power authorities.</p>
3. Design a drainage system	<p>3.1. Regional geology and geography is investigated to predict drainage parameters.</p> <p>3.2. Site investigations to assess depth of clay, depth of ground water, soil and water salinity, and structural</p>

ELEMENT	PERFORMANCE CRITERIA
	<p>or chemical impediments are used to determine the most cost effective drainage system.</p> <p>3.3. Predictions of leaching fractions and salt movements are documented, and soil amelioration and drainage management plans are developed.</p> <p>3.4. The need for leachate interception and dewatering system is determined and if required, construction specification prepared for interception and collection, disposal, reuse or recycle.</p> <p>3.5. Drains and structures are capable of carrying the design water volumes and intensities according to enterprise standards.</p> <p>3.6. Damage from water logging is minimised according to enterprise standards.</p> <p>3.7. Hydrological calculations predict volumes and rates of surface run-off according to enterprise standards.</p>
4. Determine capital expense budget	<p>4.1. Design calculations and decisions are documented and relevant information is communicated clearly through plans, specifications and manuals.</p> <p>4.2. Design output is checked by a competent designer against enterprise objectives.</p> <p>4.3. Materials requirements are determined and documented from plans and specifications.</p> <p>4.4. Labour requirements are estimated based upon documented work schedule with reasonable allowance for variances in work schedules.</p> <p>4.5. Costing attributed to each component is based upon quoted information from suppliers, or sound analysis of individual elements.</p>
5. Determine operating expense budget	5.1. Operating expense budget indicates all expenses applicable to the completed drainage system.

## Required Skills and Knowledge

### REQUIRED SKILLS AND KNOWLEDGE

This section describes the skills and knowledge required for this unit.

#### Required skills

- collect and analyse information

**REQUIRED SKILLS AND KNOWLEDGE**

- identify adverse environmental impacts of drainage and appropriate remedial action
- identify design requirements
- complete hydrological calculations
- develop specifications
- develop budgets
- develop and implement relevant enterprise OHS and environmental procedures
- use literacy skills to fulfil job roles as required by the organisation. The level of skill may range from reading and understanding documentation to completion of written reports
- use oral communication skills/language competence to fulfil the job role as specified by the organisation including questioning, active listening, asking for clarification, negotiating solutions and responding to a range of views
- use numeracy skills to estimate, calculate and record complex workplace measures
- use interpersonal skills to work with others and relate to people from a range of cultural, social and religious backgrounds and with a range of physical and mental abilities.

**Required knowledge**

- design processes
- developments in drainage technology
- leaching fractions and salt movements prediction
- monitoring systems
- waste management and environmental issues
- purpose of leachate interception and dewatering systems
- budgeting, contractual development and obligations
- environmental impacts of drainage
- cost/benefit analysis
- enterprise policies and procedures
- water transfer, recharge, reuse and harvesting systems.
- OHS and environmental protection legislation.

## Evidence Guide

<b>EVIDENCE GUIDE</b>	
The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, range statement and the Assessment Guidelines for the Training Package.	
<b>Overview of assessment</b>	
<b>Critical aspects for assessment and evidence required to demonstrate competency in this unit</b>	<p>The evidence required to demonstrate competency in this unit must be relevant to workplace operations and satisfy holistically all of the requirements of the performance criteria and required skills and knowledge and include achievement of the following:</p> <ul style="list-style-type: none"> <li>• develop specifications for water transfer, recharge, reuse and harvesting systems</li> <li>• assess the requirements for pumping capacity in a drainage system and power requirements</li> <li>• identify performance indicators for the drainage system</li> <li>• predict volumes and rates of surface run-off and system leakage</li> <li>• design a drainage system that factors in the characteristics of the irrigated landscape and soil.</li> </ul>
<b>Context of and specific resources for assessment</b>	Competency requires the application of work practices under work conditions. Selection and use of resources for some worksites may differ due to the regional or enterprise circumstances.

## Range Statement

<b>RANGE STATEMENT</b>	
The range statement relates to the unit of competency as a whole.	
Irrigation system types may include:	<ul style="list-style-type: none"> <li>• flood</li> <li>• furrow</li> <li>• micro-sprinklers</li> <li>• pop-ups</li> <li>• impact sprinklers</li> <li>• low-level lines</li> <li>• overhead sprinklers</li> </ul>

<b>RANGE STATEMENT</b>	
	<ul style="list-style-type: none"> <li>• drippers</li> <li>• micro-jets.</li> </ul>
Irrigated systems may involve:	<ul style="list-style-type: none"> <li>• water harvesting</li> <li>• delivery</li> <li>• drainage collection</li> <li>• drainage storage and treatment as well as natural drainage and treatment systems involving the removal of pollutants through evaporation, and/or clearance by filtration through surface layers.</li> </ul>

**Unit Sector(s)**

<b>Unit sector</b>	Drainage
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**Co-requisite units**

<b>Co-requisite units</b>		

**Competency field**

<b>Competency field</b>	
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