

# Unit of Competency CPCPPS5027

## Design irrigation systems

### Application

This unit specifies the skills and knowledge required to design irrigation systems to relevant Australian Standards, codes, the National Construction Code (NCC) and other relevant legislative requirements to meet occupier needs and industry standards.

This unit covers requirements for work in a consultancy or supervisory capacity in relation to the design of irrigation systems for residential, commercial, industrial, sporting ovals and agricultural properties with or without connection to reticulated supply.

In some jurisdictions, this unit of competency may form part of accreditation, licensing, legislative, regulatory or certification requirements.

### Prerequisite Unit

Nil.

### Elements and Performance Criteria

1. Evaluate design parameters.	<ul style="list-style-type: none"><li>1.1 Identify and confirm the scope of work for irrigation systems.</li><li>1.2 Determine design requirements from relevant Australian Standards, codes, plans, specifications and client brief.</li><li>1.3 Conduct cost-benefit analysis comparing a range of pipe materials and system designs.</li><li>1.4 Interpret, analyse and apply statutory and regulatory requirements and relevant Australian Standards and codes for the design of irrigation systems.</li><li>1.5 Obtain trade and technical manuals and interpret manufacturer requirements for irrigation systems.</li><li>1.6 Conduct research to outline design parameters.</li><li>1.7 Conduct flow and pressure tests for the irrigation systems.</li><li>1.8 Establish water sources, volumes and areas to be irrigated.</li><li>1.9 Analyse and categorise soil types, documenting the impacts on irrigation systems as per workplace procedures.</li></ul>
2. Plan and detail system components.	<ul style="list-style-type: none"><li>2.1 Plan layout of pipework systems including the type and location of fittings, valves and controls.</li><li>2.2 Detail the type, location and requirements for backflow prevention devices.</li><li>2.3 Calculate pipe sizes, velocities, flows and pressures for a range of applications.</li><li>2.4 Specify the approved materials and jointing methods for irrigation systems.</li><li>2.5 Detail sections and components of the irrigation system.</li><li>2.6 Design pipe supports for a range of applications.</li><li>2.7 Size and detail pump enclosure and control requirements.</li><li>2.8 Specify installation requirements for irrigation management system.</li><li>2.9 Determine water storage requirements.</li><li>2.10 Make allowance for pipe movement.</li></ul>
3. Design and size systems	<ul style="list-style-type: none"><li>3.1 Analyse requirements and consider options available to design irrigation systems.</li><li>3.2 Design delivery systems and layout.</li></ul>

	3.3	Design and size irrigation systems.
	3.4	Determine required water application to establish and maintain plant life.
	3.5	Apply sustainability principles and concepts throughout the design process.
4. Prepare documentation.	4.1	Prepare and document client brief of the desired design.
	4.2	Prepare and document plans and specifications for a range of irrigation systems.
	4.3	Prepare testing and commissioning schedule.
	4.4	Produce operation and maintenance manual.

## Foundation skills

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

## Unit Mapping Information

Supersedes and is equivalent to CPCPPS5027A Design irrigation systems.

## Links

Companion Volume Implementation Guide:

<https://vetnet.education.gov.au/Pages/TrainingDocs.aspx?q=7e15fa6a-68b8-4097-b099-030a5569b1ad>

# Assessment Requirements for CPCPPS5027 Design irrigation systems

## Performance Evidence

To demonstrate competency, a candidate must meet the performance criteria for this unit by:

- designing, sizing and documenting layout details of an irrigation system including specification for a:
  - sports oval incorporating stormwater collection and use, with a mains pressure drinking water top-up and with chemical additives
  - a landscaped area for a mixed development site connected to a main pressure recycled (non-drinking) water main
- evaluating and documenting design parameters to relevant Australian Standards and codes, and regulatory, client and manufacturer requirements
- planning and detailing system components that include:
  - backflow prevention devices
  - irrigation management-control system
  - pumping requirements
  - water delivery outlets
  - piping requirements
- designing and sizing two irrigation systems, using appropriate calculations and computer software for specific applications.

## Knowledge Evidence

To be competent in this unit, a candidate must demonstrate knowledge of:

- statutory and regulatory requirements related to designing irrigation systems including:
  - Commonwealth government
  - state or territory governments
  - local authorities
  - AS/NZS 3500 National plumbing and drainage
  - AS2200 Design charts for water supply and sewerage
  - National Construction Code (NCC)
  - state or territory health departments
- common terminology and definitions used in the design of irrigation systems
- design requirements including:
  - architectural plans
  - backflow requirements
  - interpretation and application of irrigation services, drawings and symbols
  - irrigation management system
  - owner requirements

- o precipitation and evaporation rates
  - o pumping requirements
  - o required water application to establish and maintain plant life
  - o source of irrigation water
  - o sprinkler head systems
  - o system requirements
  - o water storage requirements
- cost-benefit analysis comparing the range of suitable materials and system choices available to enable cost-effective choices without compromising the integrity of the project
- manufacturer requirements including:
  - o irrigation management system
  - o material specification
  - o pump tables
  - o sprinkler head performance
  - o sub-surface irrigation
  - o technical and trade manuals
- nature of materials used and effects of performance under various conditions including:
  - o composite pipework
  - o copper (Cu)
  - o cross-linked polyethylene (PE-X)
  - o polypropylene (PP)
  - o polybutylene (PB)
  - o polyvinyl chloride (PVC)
- characteristics and application of different backflow prevention devices including:
  - o double-check valve assembly (DCV)
  - o dual-check valve with intermediate vent (DuCV)
  - o pressure type vacuum breaker (PVB)
  - o reduced pressure zone device (RPZD)
  - o registered air gap (RAG)
  - o registered break tank (RBT)
  - o reduced pressure detector assembly (RPDA)
  - o reduced pressure zone device (RPZD)
  - o other approved backflow prevention devices
- layout of pipework systems including:
  - o distribution
  - o dual feed systems
  - o range pipes
  - o ring main
  - o single pipe
  - o control stations
- sections and components of the irrigation systems including:
  - o irrigation stations
  - o manifold systems
  - o sensors
  - o automatic controls
  - o sprinklers, drippers and irrigators
  - o sprinkler patterns
- testing and commissioning schedule requirements including:

- o defect inspection
  - o hydrostatic
  - o mains pressure
  - o performance
  - o quality assurance (QA) audit
  - o system certification
  - o flow test
  - o leak check
  - o pressure test
  - o system defect
  - o system functions as per design
  - o valve and system operation
- operation and maintenance manual requirements including:
  - o as installed drawings
  - o results of commissioning test
  - o certification documentation
  - o maintenance schedules
  - o manufacturer brochures and technical information
  - o operational procedures
  - o valve function
- installation requirements including:
  - o pipe connection
  - o bedding and backfilling
  - o corrosion
  - o cover
  - o ground stability
  - o impact
  - o level of workmanship
  - o manufacturer recommendations
  - o pipe support
  - o provision for pipe movement
  - o serviceability and access
- delivery systems and layout requirements including:
  - o main delivery
  - o number and design control
  - o design:
    - avoiding obstacles
    - irregular shapes
    - minimising water wastage
    - range of irrigation applications
  - o range pipes
  - o ring mains
  - o size and water delivery of sprinklers
  - o sprinkler head patterns and placement
- plans and specification requirements including:
  - o plans:
    - axonometrics
    - cross-sections
    - details
    - elevations

- isometrics
  - schematics
  - sections
- o specifications:
  - bedding
  - flow requirements
  - irrigation management control system
  - jointing
  - manufacturer requirements
  - materials
  - pumps
  - residual pressures
  - work health and safety (WHS)
  - specialised components
  - sprinkler head selection
  - storage tanks
  - support
  - testing
  - valve selection
  - water treatment
  - workmanship
- principles of technology used in the design of irrigation systems for a range of applications
- characteristics of different soil types and the impact on the irrigation systems design
- characteristics and application of different fittings, valves and controls
- characteristics and application of different jointing methods
- flow and pressure testing procedures
- information required to undertake a desktop study to outline design parameters
- pipe support design requirements
- sustainability principles and concepts including:
  - o selecting appropriate material to ensure minimal environmental impact
  - o efficient use of material
  - o efficient energy usage/capital outlay comparison
  - o water efficiency
  - o re-use of water, such as rainwater, grey water and recycled non-drinking water
  - o consideration of the Green Building Council of Australia rating scheme.

## Assessment Conditions

Assessors must satisfy the requirements for assessors listed in the Standards for Registered Training Organisations.

This unit must be assessed in the workplace or a close simulation using realistic workplace conditions, materials, activities, responsibilities, procedures, safety requirements and environmental considerations.

## Links

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