

Unit of Competency CPCPPS5026

Design rainwater collection, storage, distribution and re-use systems

Application

This unit specifies the skills and knowledge required to design systems for the collection, storage, distribution and re-use of rainwater for drinking and non-drinking uses, including irrigation, toilet flushing and other uses approved by relevant authorities for high-rise mixed development buildings and wide span projects, such as a school or industrial complex.

The role involves interaction with architects, builders, suppliers, clients and relevant planning authorities and requires a sound understanding of applicable legislation, standards and codes.

The unit requirements are typically carried out by experienced people such as hydraulic design consultants or design engineers.

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">1.1 Establish scope of work for rainwater harvesting systems for wide span and high-rise building projects.1.2 Establish performance requirements considering safety of system users or building occupants.1.3 Determine design requirements from relevant Australian Standards, codes, plans, specifications and client brief.1.4 Apply sustainability principles and concepts as part of the design process.1.5 Analyse potential contamination sources and create design solutions.1.6 Establish rainfall patterns and required rainwater storage volumes.1.7 Interpret manufacturer requirements and trade and technical manuals for rainwater harvesting systems.1.8 Conduct research to outline design parameters.1.9 Conduct cost-benefit analysis to compare a range of pipe materials and system designs.
2. Plan and detail system.	<ul style="list-style-type: none">2.1 Specify tank type and location.2.2 Plan layout of pipework systems including type and location of fittings, valves and controls.2.3 Plan and detail first-flush systems.2.4 Specify water contamination solutions and filtration systems.2.5 Calculate pipe size for a range of applications.2.6 Plan and detail separation of services and backflow prevention devices.

	2.7 Specify approved non-contaminating materials and jointing methods for rainwater harvesting and design pipe supports. 2.8 Size and detail pump and ancillary requirements. 2.9 Specify installation requirements. 2.10 Specify water treatment according to state and territory health requirements. 2.11 Specify vermin protection according to manufacturer and state and territory requirements. 2.12 Provide allowance for expansion and contraction.
3. Design and size systems.	3.1 Design and detail rainwater harvesting systems. 3.2 Design and detail rainwater re-use systems. 3.3 Design and size rainwater harvesting systems using calculations and manufacturer's data sheets.
4. Prepare documentation.	4.1 Produce client brief of the preferred design. 4.2 Prepare plans and specifications for a range of rainwater harvesting 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 CPCPPS5026A Design rainwater collection, storage, distribution and re-use systems.

Links

Companion Volume Implementation Guide:

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

Assessment Requirements for CPCPPS5026 Design rainwater collection, storage, distribution and re-use systems

Performance Evidence

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

- designing, sizing and documenting the layout details for:
 - a high-rise mixed development building, and
 - a wide span project such as a school or industrial complex
- preparing plans and specifications for each of the above projects and include the following system components:
 - authority connection
 - backflow prevention requirements
 - filters
 - fixtures and fitments
 - piping systems
 - pumps
 - storage
 - water treatment
- documenting the evaluation of design parameters including rainfall, client, regulatory, manufacturer and relevant Australian Standard requirements and storage capacity for each design
- preparing plans and specifications for rainwater harvesting and re-use systems to industry standards.

Knowledge Evidence

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

- common terminology and definitions used in the design of rainwater collection, storage, distribution and re-use
- key features of work plans and specifications
- nature of materials used and effects of performance under various conditions
- organisational quality procedures and processes
- principles of technology in the design of rainwater collection, storage, distribution and re-use for residential, commercial and industrial applications to include water treatment and backflow protection of drinking and non-drinking water supply systems
- terminology and definitions used in hydraulic design

- work health and safety (WHS) requirements, including relevant statutory regulations, codes and standards
- scope of work:
 - interpreting plans and specifications
 - rainfall analysis
 - sizing and documenting layout of rainwater harvesting systems for residential, commercial and industrial applications to include water treatment and backflow protection of drinking and non-drinking water supply systems
- design requirements:
 - architectural plans
 - building specifications
 - owner requirements
 - pipework identification
 - sizing of pipework
 - backflow protection of drinking and non-drinking water supply systems
 - water treatment
 - specialist water use applications
- contamination:
 - bacterial
 - heavy metal
 - inorganic
 - odour
 - organic
 - taste
 - silt
 - viral
 - vermin
- cost-benefit analysis comparisons of:
 - design styles
 - energy costs
 - expected design life
 - labour costs
 - material costs
 - safety factors
 - speed of installation
 - suitable materials
- statutory, regulatory requirements and relevant Australian Standards and codes:
 - AS/NZS 3500 Plumbing and drainage set
 - AS 2200 Design charts for water supply and sewerage
 - National Construction Code (NCC)
- manufacturer requirements:
 - material specifications
 - pipe sizing

- o pump installation
 - o storage system
 - o technical and trade manuals
- information gathered through desktop study to support design purposes:
 - o architectural and building plans
 - o developer plans
 - o manufacturer data
 - o building applications
 - o brochures
 - o forms
 - o policies
 - o reports
- performance requirements:
 - o compliance limits for:
 - bacteria levels
 - nutrients
 - pH
 - silt control
 - vermin protection
 - overflow discharge requirements
 - o requirements established using relevant Australian Standards, codes and local authority plans for:
 - cover
 - discharge
 - flow conditions
 - pipe grades
- tank types:
 - o concrete
 - o fibreglass
 - o metal
 - o polymer
 - o other approved materials
- tank locations:
 - o above-ground
 - o in-ground
- layout of pipework systems:
 - o gravity systems
 - o pumped systems
 - o designing to not unduly affect building integrity and aesthetic appeal
 - o designing to include principles of economy, serviceability, durability and fit for use
- fittings, valves and controls:
 - o backflow prevention devices
 - o inspection openings
 - o irrigation control systems

- o isolating valves
 - o level indicators
 - o pump controls
- first-flush systems:
 - o electronic
 - o float-activated
 - o mechanical
 - o volume-activated
- filtration systems:
 - o overflow devices
 - o sand
 - o screens
 - o settlement tanks
 - o strainers
- water contamination solutions:
 - o disinfection
 - o ultraviolet
- pipe size calculations:
 - o determination of flow
 - o interpretation of design charts and tables
 - o pipe sizing calculations
 - o reduced level calculations
- materials:
 - o copper (Cu)
 - o polyethylene (PE)
 - o polypropylene (PP)
 - o polybutylene (PB)
 - o unplasticised polyvinyl chloride (uPVC)
 - o other approved materials
- jointing methods:
 - o brazing
 - o compression joints
 - o electrofusion welding
 - o mechanical joints
 - o solvent cement
 - o threading
 - o other approved jointing methods
- pipe support:
 - o anchors
 - o bedding
 - o bracket spacing
 - o concrete support
 - o corrosion protection

- o manufacturer-recommended specific fixings
 - o material requirements
 - o provision for expansion
 - o saddles
- pump and ancillary requirements:
 - o automatic controls
 - o pump duties
 - o corrosion-resistant materials
 - o level controls and alarms
 - o pump selection and pump sizing, based on:
 - flow
 - velocity
 - lift
 - probable simultaneous demands
- installation requirements:
 - o level of workmanship
 - o manufacturer-recommended specific fixings
 - o pipe support
 - o provision for expansion
 - o serviceability and access
 - o pipe protection:
 - cover
 - corrosion
 - impact
 - fire rating
- rainwater re-use systems:
 - o roof water collection
 - o water treatment
 - o pumps
 - o approved drinking and non-drinking use
 - o storage:
 - tanks
 - open in-ground (dam)
- methods for applying sustainability principles and concepts:
 - o selecting appropriate material to ensure minimal environmental impact
 - o efficient use of material
 - o efficient energy usage/capital outlay comparison
 - o local environment consideration
 - o water efficiency
 - o re-use of greywater
 - o consideration of the Green Building Council of Australia rating scheme
- types of plans:
 - o axonometrics

- o cross-sections
 - o details
 - o elevations
 - o isometrics
 - o sections
 - o schematics produced using:
 - computer generation
 - drawing equipment
- specification:
 - o backflow prevention
 - o flow requirements
 - o jointing
 - o manufacturer requirements
 - o materials
 - o residual pressures
 - o work health and safety (WHS)
 - o specialised components
 - o storage
 - o support
 - o testing
 - o valve selection
 - o water treatment
 - o workmanship
- testing for:
 - o air pressure
 - o backflow protection
 - o defect inspection
 - o drainage inspection
 - o hydrostatic
 - o performance:
 - flow
 - pressure
 - o water quality
 - o quality assurance (QA) audit
- commissioning schedule information:
 - o balancing disposal system
 - o flow and pressure adjustments
 - o leak check
 - o pressure test
 - o pump settings
 - o safety requirements
 - o system certification
 - o system defects

- o system flushing
- o system functions as per design
- o system purge
- o valve operation
- o ventilation
- o vermin control
- operation and maintenance manual information:
 - o as installed drawings
 - o certification documentation
 - o maintenance schedules
 - o manufacturer brochures
 - o ongoing maintenance requirements
 - o pump maintenance
 - o regular inspections
 - o results of commissioning test
 - o safety management system
 - o system detail, setting and operations
 - o valve function
 - o system operational parameter adjustments and checks:
 - disinfection
 - first flush devices
 - pH
 - silt control
 - suspended solids
 - water quality.

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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