



Australian Government

Department of Education, Employment and Workplace Relations

CPCPPS5005A Design grey water re-use systems in sewerred areas

Release: 1

CPCPPS5005A Design grey water re-use systems in sewerred areas

Modification History

Not Applicable

Unit Descriptor

Unit descriptor This unit of competency specifies the outcomes required to design grey water re-use systems in sewerred areas. The unit requires the ability to consider legislation, risk implications, and collection, treatment, diversion and storage options when designing these systems.

Application of the Unit

Application of the unit This unit of competency supports the needs of experienced tradespeople with a responsibility for designing grey water re-use systems in sewerred areas.

Licensing/Regulatory Information

Not Applicable

Pre-Requisites

Prerequisite units Nil

Employability Skills Information

Employability skills This unit contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency.

Performance criteria describe the performance needed to demonstrate achievement of the element. Where bold italicised text is used, further information is detailed in the required skills and knowledge section and the range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1. Evaluate design parameters.	1.1. Scope of work is established for design of grey water re-use systems for wide span and high-rise building projects. 1.2. Design requirements are determined from plans, specifications and client briefs. 1.3. Potential household or community health and environmental risks are identified and measures to protect public health are identified and implemented. 1.4. Cost-benefit analysis is conducted. 1.5. National water programs, statutory and regulatory requirements, and Australian and New Zealand standards for the design of grey water re-use systems are interpreted, analysed and applied. 1.6. Manufacturer requirements and trade and technical manuals are interpreted. 1.7. Additional research, including a desktop study, is conducted to outline design parameters. 1.8. Performance requirements are established.
2. Plan and detail system components.	2.1. Primary, secondary and advanced secondary treatment and tertiary systems are detailed. 2.2. Layout of pipework systems and type and location of fittings, valves, indexing valves and other system components are planned. 2.3. Changes to building drainage system are designed and detailed, and inspection requirements are identified. 2.4. Diversion and storage options are evaluated, problems identified and solutions applied. 2.5. Diversion to sewer options, wet weather storage options and land application options are detailed. 2.6. Stored and pressurised wastewater systems for irrigation and toilet or urinal flushing are detailed. 2.7. Holding tanks and gullies are designed and detailed. 2.8. Pipe size and pump duty calculations are made and pumpwell, pump and pump control requirements are sized and detailed. 2.9. Approved materials and jointing methods for grey water re-use systems are evaluated, pipe fixings are designed and installation requirements are specified.

ELEMENT	PERFORMANCE CRITERIA
3. Design and size systems.	3.1. Grey water re-use systems are designed for a range of residential, commercial and industrial applications. 3.2. Grey water re-use systems are designed and sized using computer software packages.
4. Prepare documentation.	4.1. Plans are prepared for a range of grey water re-use systems. 4.2. Specification for a grey water re-use system is prepared. 4.3. Testing and commissioning schedule is prepared. 4.4. Operation and maintenance manual is produced.

Required Skills and Knowledge

REQUIRED SKILLS AND KNOWLEDGE

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

Required skills

Required skills for this unit are:

- applying design concepts and principles relating to hydraulic systems
- communication skills to:
 - communicate with others to ensure safe and effective work practices
 - confirm job specifications and client requirements
 - enable clear and direct communication, using questioning to identify and confirm requirements, share information, listen and understand
 - read and interpret:
 - plans, specifications, drawings and design briefs
 - standards and manufacturer requirements and manuals
 - statutory and regulatory requirements
 - use language and concepts appropriate to cultural differences
 - use and interpret non-verbal communication, such as hand signals
- written skills to prepare documentation, including:
 - operation and maintenance manual
 - plans, specifications and schedules
- innovation skills to develop creative and responsive approaches
- numeracy skills to:

REQUIRED SKILLS AND KNOWLEDGE

- apply measurements and calculations
- interpret data
- planning and organisational skills to:
 - research, collect, organise and understand information relating to the design of grey water re-use systems in sewerage areas
 - take initiative and make decisions
- problem solving skills to analyse requirements, consider options and design an appropriate system.

Required knowledge

Required knowledge for this unit is:

- Australian and New Zealand standards, manufacturer specifications, Building Code of Australia (BCA) and other applicable codes or standard operating procedures relevant to the sector
- hazards associated with devices and systems used in the hydraulic sector
- installation methods used in hydraulic systems
- nature of materials and effect of their performance in a variety of conditions
- OHS and organisational quality procedures and processes
- principles of technology in the design of grey water re-use systems for all classes of building
- terminology and definitions used in hydraulic design
- work drawings and specifications
- workplace safety requirements, including relevant statutory regulations, codes and standards.

Evidence Guide

EVIDENCE GUIDE

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.

Overview of assessment

This unit of competency could be assessed in the workplace or a close simulation of the workplace environment providing that simulated or project-based assessment techniques fully replicate plumbing and services workplace conditions, materials, activities, responsibilities and procedures.

Critical aspects for assessment and evidence required to demonstrate competency in this unit

A person who demonstrates competency in this unit must be able to provide evidence of:

- evaluating and documenting design parameters, including client, regulatory, manufacturer and Australian and New Zealand standard requirements for a range of grey water re-use systems
- planning and detailing system components, including:
 - holding tanks
 - indexing valves
 - piping systems
 - pumpwells
- designing and sizing a grey water re-use system
- preparing plans for a range of grey water re-use systems to industry standards
- preparing specifications for a grey water re-use system
- preparing testing and commissioning schedules
- preparing operation and maintenance manuals.

Context of and specific resources for assessment

This competency is to be assessed using standard and authorised work practices, safety requirements and environmental constraints.

Assessment of essential underpinning knowledge will usually be conducted in an off-site context.

Assessment is to comply with relevant regulatory

EVIDENCE GUIDE

or Australian standards' requirements.

Resource implications for assessment include:

- an induction procedure and requirement
- realistic tasks or simulated tasks covering the minimum task requirements
- relevant specifications and work instructions, including design brief drawings, specifications, codes, design concepts and construction schedules
- tools and equipment appropriate to applying safe work practices, including computers, software and calculators
- workplace instructions relating to safe working practices and addressing hazards and emergencies
- material safety data sheets
- research resources, including industry related systems information.

Reasonable adjustments for people with disabilities must be made to assessment processes where required. This could include access to modified equipment and other physical resources, and the provision of appropriate assessment support.

Method of assessment

Assessment methods must:

- satisfy the endorsed Assessment Guidelines of the Construction, Plumbing and Services Training Package
- include direct observation of tasks in real or simulated work conditions, with questioning to confirm the ability to consistently identify and correctly interpret the essential underpinning knowledge required for practical application
- reinforce the integration of employability skills with workplace tasks and job roles
- confirm that competency is verified and able to be transferred to other circumstances and environments.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a period of time reflecting the scope of the role

EVIDENCE GUIDE

and the practical requirements of the workplace

- where the assessment is part of a structured learning experience the evidence collected must relate to a number of performances assessed at different points in time and separated by further learning and practice, with a decision on competency only taken at the point when the assessor has complete confidence in the person's demonstrated ability and applied knowledge
- all assessment that is part of a structured learning experience must include a combination of direct, indirect and supplementary evidence.

Assessment processes and techniques should as far as is practical take into account the language, literacy and numeracy capacity of the candidate in relation to the competency being assessed.

Supplementary evidence of competency may be obtained from relevant authenticated documentation from third parties, such as existing supervisors, team leaders or specialist training staff.

Range Statement

RANGE STATEMENT

The range statement relates to the unit of competency as a whole. It allows for different work environments and situations that may affect performance. Bold italicised wording, if used in the performance criteria, is detailed below. Essential operating conditions that may be present with training and assessment (depending on the work situation, needs of the candidate, accessibility of the item, and local industry and regional contexts) may also be included.

Scope of work:

- includes:
 - interpretation of plans and specifications
 - sizing and documenting layout of grey water re-use systems for applications, including residential, commercial and industrial

RANGE STATEMENT

- may be for new projects or an existing structure being renovated, extended, restored or maintained.
- Design requirements*** include:
- architectural specifications
 - builder specifications
 - owner requirements
 - specialist water use applications.
- Health and environmental risks*** include:
- health risks:
 - abdominal pain
 - acute enteritis
 - anaemia
 - anorexia
 - bacillary dysentery
 - chest pain
 - cholera
 - common colds
 - coughing
 - diarrhoea
 - digestive and nutritional disturbances
 - dysentery
 - fever
 - gastroenteritis
 - giardiasis
 - helminthes, including flukes and worms
 - hepatitis
 - hookworm disease
 - infectious hepatitis
 - meningitis
 - muscle aches
 - neurological symptoms, including nervousness and insomnia
 - poliomyelitis
 - respiratory infections, such as pneumonia
 - restlessness
 - salmonellosis (food poisoning)
 - taeniasis
 - toxoplasmosis
 - typhoid fever

RANGE STATEMENT

	• vomiting • weight loss • environmental risks: • algal blooms • excess nutrient loads • fish kills • oxygen depletion.
<i>Measures to protect public health</i> include:	• auditing • contact avoidance • contact minimisation • disinfection and sterilisation • education • legislation • licensing • maintenance • separation barriers • set back distances • timing discharges • wet weather storage.
<i>Cost-benefit analysis</i> includes:	• comparison of range of suitable treatment, disposal options, materials, system choices and disinfection options • water savings and environmental benefits compared to initial and ongoing maintenance costs.
<i>National water programs, statutory and regulatory requirements, and Australian and New Zealand standards</i> include:	• Acts and regulations • Australian and New Zealand standard requirements, including: • AS/NZS1546 On-site domestic wastewater treatment units • AS/NZS1547 On-site domestic wastewater management • AS/NZS3500 National plumbing and drainage set • AS2200 Design charts for water supply and sewerage • BCA • local and state government policies, including group and strata titling.
<i>Manufacturer requirements</i>	• material specifications

RANGE STATEMENT

include:

- pump tables
- sizing tables
- technical and trade manuals.
- architectural and building plans
- council plans
- developer plans
- manufacturers' data
- other documents, including:
 - applications
 - brochures
 - forms
 - policies
 - other reports as available.

Desktop study includes collection and interpretation of existing data for design purposes from:

Performance requirements include:

- compliance limits for:
 - bacteria levels
 - chlorine levels
 - nutrients
 - pH
 - phosphates
- requirements established using Australian and New Zealand standards and local authority plans, including:
 - cover
 - discharge
 - flow conditions
 - pipe grades.

Layout of pipework systems:

- includes:
 - drainage systems
 - elevated pipework systems
 - gravity systems
 - pumped and rising mains
 - stack systems, including:
 - fully vented
 - fully vented modified
 - single stack
 - single stack modified
- should not unduly affect building integrity and aesthetic appeal
- should have principles of economy,

RANGE STATEMENT

	serviceability, durability and fit for use applied.
<i>Fittings, valves, indexing valves and other system components</i> include:	• bends • first junctions • inspection openings • reflux valves • traps.
<i>Land application options</i> include:	• covered surface irrigation • shallow subsurface irrigation • surface irrigation systems open to atmospheric pressure.
<i>Holding tanks</i> include:	• connections • pumps • sizing • switches • valves.
<i>Gullies</i> include:	• design and installation of gullies for the collection of grey water • diversion of gullies to holding tanks or treatment systems.
<i>Pipe size and pump duty calculations</i> include:	• determination of flow and fixture loadings • gradient calculations • interpretation of design charts and tables • pipe sizing calculations • reduced level calculations.
<i>Pumpwell, pump and pump control requirements</i> include:	• automatic controls • capacity • corrosion-resistant materials • detailing • high and low-level water controls and alarms • inlet and outlet design requirements • installation and mounting requirements • macerator requirements • pump sizing • pumpwell sizing • selection of pump type • valve requirements • warning system.
<i>Materials</i> include:	• concrete • earthenware • fittings

RANGE STATEMENT

	• high density polyethylene (HDPE) • low density polyethylene (LDPE) • unplasticised polyvinyl chloride (PVC-U).
Jointing methods include:	• brazing • compression joints • gluing • mechanical joints • solvent cement • threading • welding.
Pipe fixings include:	• anchors • bedding • bracket spacing • concrete support • corrosion protection • cover • material requirements • saddles • wall brackets.
Installation requirements include:	• bedding • clipping • concrete support • installation details • jointing requirements • level of workmanship.
Plans include:	• elevations • details • cross-sections • isometrics • axonometrics • schematics, which may be produced using: • computer generation • Indian ink • pencil • pigment liner • sections.
Specification includes:	• bedding • clipping • concrete support

RANGE STATEMENT

	• detailing of specialised components • holding tanks • jointing • manufacturer requirements • materials • workmanship.
Testing includes:	• air pressure test • drainage inspection • hydrostatic test • quality assurance (QA) audit.
Commissioning schedule includes:	• balancing sprinklers • flow and pressure adjustments • leak check • pump settings • system flushing.
Operation and maintenance manual includes:	• check for blockages • land application compliance checks • leak detection • ongoing maintenance requirements • pump maintenance • regular inspections • surface ponding checks • system operational parameter adjustments and checks, including: • chlorine levels • dissolved oxygen • nitrates • pH • phosphates • suspended solids.

Unit Sector(s)

Unit sector Plumbing and services

Co-requisite units

Co-requisite units Nil

Functional area

Functional area