



Australian Government

Department of Education, Employment and Workplace Relations

NWP102B Design a basic water system model

Revision Number: 2

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Modification History

NWP102B Release 2: Layout adjusted. No changes to content.

NWP102B Release 1: Primary release.

Unit Descriptor

This unit of competency describes the outcomes required to explore and apply the characteristics of basic water and wastewater systems to a system model. This includes understanding the characteristics of simple water and wastewater systems, together with the application of scientific principles to the development of a working water system model.

Application of the Unit

This unit supports the attainment of skills and knowledge required for those who are preparing to enter or considering entry to the water industry workforce or further training. When delivered and assessed as part of a qualification, the unit will be customised to ensure its relevance to work-like activities and assignment and field work related water research. The candidate will benefit from partnership with a water industry organisation. There are opportunities to integrate delivery and assessment of this unit with mainstream educational programs (mathematics, science, geography, physics, engineering and English).

Licensing/Regulatory Information

Not applicable.

Pre-Requisites

Not applicable.

Employability Skills Information

This unit of competency contains employability skills.

Elements and Performance Criteria Pre-Content

Elements describe the essential outcomes of a unit of competency. Performance criteria describe the required performance needed to demonstrate achievement of the element. Where ***bold italicised*** text is used, further information is detailed in range statement. Assessment of performance is to be consistent with the evidence guide.

Elements and Performance Criteria

ELEMENT	PERFORMANCE CRITERIA
1 Investigate local water and wastewater systems	<p>1.1 Find out about and explain <i>source</i> of local water supply system and explore its characteristics.</p> <p>1.2 Identify local water distribution system and explain its characteristics.</p> <p>1.3 Find out about and explain water metering and allocation system and related water pricing system.</p> <p>1.4 Find out about local wastewater collection and treatment systems and explain their characteristics.</p>
2 Apply basic scientific principles to the operation of a water system	<p>2.1 Explore and explain <i>basic principles governing the natural flow of water</i>.</p> <p>2.2 Find out about <i>basic principles governing the distribution of water</i> through pipe networks and explain them.</p> <p>2.3 Use scientific principles in the design, construction and operation of a working model of a water system.</p> <p>2.4 Use scientific principles to measure the flow of water.</p>
3 Investigate safe and effective operations of water and wastewater systems	<p>3.1 Find out about potential risks to health of inappropriately installed, managed or used water systems and explain the risks.</p> <p>3.2 Find out about potential risks to health of inappropriately installed, managed or used wastewater systems and explain the risks.</p> <p>3.3 Find out about and explain <i>ways</i> to use water wisely and dispose of wastewater safely.</p> <p>3.4 Find out about and explain ways that communities can improve the efficiency and environmental impact of wastewater management.</p>

Required Skills and Knowledge

This describes the essential skills and knowledge and their level, required for this unit.

Required skills:

- use research and investigation to gather information and test models and hypotheses
- use literacy skills for verbal and written communication
- use interpersonal and communication skills, including listening, questioning and receiving feedback
- work cooperatively and collaboratively with others to complete project tasks
- adapt and modify activities depending on differing project contexts and environments
- use appropriate techniques to solve or report problems identified when completing project tasks
- carry out calculations that may be required when completing tasks, particularly those including the four basic mathematical operations
- apply basic principles of science, including hydraulics, to develop an understanding of the flow of water
- take appropriate initiative to deal with problems and complete tasks
- identify and use equipment, tools and other technology required to complete project tasks
- recognise limitations, ask for help and seek clarification or information about requirements and procedures

Required knowledge:

- mathematical calculations and techniques
- relevant scientific knowledge, including basic principles of hydraulics, valve operation and pipe layout
- procedures for identifying and using relevant technology when carrying out calculations
- typical problems in the design of simple water systems and appropriate actions and solutions

Evidence Guide

The evidence guide provides advice on assessment and must be read in conjunction with the performance criteria, required skills and knowledge, the range statement and the Assessment Guidelines for the Training Package.

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

The candidate should demonstrate the ability to explore and apply the characteristics of basic water and wastewater systems to a system model including:

- investigating, interpreting and communicating the essential characteristics of local water and wastewater systems
- selecting and applying basic scientific principles associated with the design and construction of a water system model
- problem solving sound practices that can be adopted by householders and communities for the safe and effective management of a water and wastewater system

Context of and specific resources for assessment

Access to resources including:

- library, water enterprise information, information sources for research and investigation
- mentors, advisors and teachers able to guide and support research and investigation of water resource management
- guided visits to key locations associated with water resource management

Access must be provided to appropriate learning and assessment support.

Assessment processes and techniques must take into account language, literacy and cultural factors which might have an impact on the candidate's demonstration of competency.

Validity and sufficiency of evidence requires that:

- competency will need to be demonstrated over a variety of assignments and activities reflecting the scope and practical requirements of research and practical assignments
- assessment can be through assignments, projects, excursions and simulated project-based activity and must include evidence relating to each of the elements in this unit

In all cases where practical assessment is used it will be combined with targeted questioning to assess underpinning knowledge.

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. Add any 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.

Source of local water supply system may be:

- groundwater systems
- river systems
- lakes
- dams

Basic principles governing the natural flow of water may include:

- introduction to basic fluid mechanics
- introduction to basic hydraulics
- principles governing:
 - hydraulics
 - gradient
 - pressure
 - current and flow
 - depth
 - dam design
 - river channel behaviour

Basic principles governing the distribution of water may include:

- introduction to basic engineering principles governing the operation of valves and pumps
- introduction to basic hydraulic principles governing pipe network design and layout
- flow measurement

Ways to use water wisely and dispose of wastewater safely may include:

- participation in, or reference to, government programs and initiatives, such as:
 - water recycling
 - storm water catchment and reuse
 - on site treatment
 - Waterwatch program
 - Waterwise program
 - Greening Australia program
 - Landcare program

Unit Sector(s)

Not applicable.