

## PIL309A Install and maintain permaculture water systems

This competency standard covers the process of installing and maintaining permaculture water systems. It requires the ability to organise resources for installation work, set out and prepare site, install water system components, complete installation work, commission water system systems and communicate with work team members, supervisors, contractors and consultants. Installing permaculture water systems requires knowledge of methods and techniques of permaculture water systems, components of permaculture water systems, behaviour of water on varying terrain and soil types, soil water retention testing techniques, soil characteristics and enterprise OHS procedures.

Element	Performance Criteria
1 Organise resources for installation work	<p>1.1 <b>Materials, tools, equipment and machinery</b> are selected according to permaculture water storage, movement and filtering systems design requirements and enterprise work procedures</p> <p>1.2 The construction site for the <b>permaculture water systems</b> and construction method are identified according to the site and permaculture water systems plans and <b>enterprise work procedures</b></p> <p>1.3 Parts and <b>equipment</b> delivered to site are checked according to system drawings and specifications.</p> <p>1.4 Pre-operational and safety checks are carried out on tools, equipment and machinery according to manufacturers specifications and enterprise work procedures</p> <p>1.5 <b>OHS hazards</b> are identified, risks assessed, controls implemented and reported to the supervisor</p> <p>1.6 Suitable <b>safety</b> and <b>personal protective equipment (PPE)</b> are selected, used and maintained</p>

		1.7	<b>Water supply</b> is checked to ensure that it is compatible with system specifications.
2	Set out and prepare site	2.1	Measurement and marking out of permaculture water systems lines is consistent with plan.
		2.2	Trenches where constructed are at the specified depth without damage to services, facilities, features and established plants.
		2.3	Equipment operation and work practices conform with enterprise and legislative <b>OHS requirements</b>
		2.4	Regulations and legislation relevant to the situation are observed.
		2.5	Work practices reflect sustainable horticulture principles and respond to local community requirements.
3	Install permaculture water systems components and materials	3.1	Plan is interpreted and where applicable, contractors are supervised and work is monitored to conform to plan.
		3.2	Components and materials are assembled and connected according to plan, joints are completed and tested according to manufacturer's specifications.
		3.3	Fittings and valves are fitted and adjusted to requirements of the installation plan, and all joints are secured according to enterprise guidelines.
		3.6	A <b>clean and safe work area</b> is maintained while installation work is carried out
		3.7	Tools are chosen appropriate to the task being undertaken, used according to guidelines and safe working practices are employed.
4	Complete installation work	4.1	Earthworks are finished off to plan specifications and enterprise work procedures
		4.2	The system configuration and capacity matches the installation plan.

		4.3	The site is restored and <b>waste material</b> or material not for immediate use is removed from the site and disposed of in an environmentally aware and safe manner according to enterprise work procedures
		4.4	Tools, equipment and machinery are cleaned, maintained and stored according to enterprise work procedures
5	Commission permaculture water systems	5.1	Start up sequence is in accordance with operations manual.
		5.2	System is flushed as required.
		5.3	Operating faults are identified and corrective actions taken according to operations manual.
		5.4	<b>Testing</b> and monitoring equipment is calibrated to manufacturers specifications
		5.5	Work outcomes are recorded or reported to the supervisor according to enterprise work procedures
6	Monitor and maintain permaculture water systems	6.1	Water systems are regularly checked and monitored for optimum performance
		6.2	Routine <b>maintenance procedures</b> are carried out on permaculture water systems
		6.3	Repairs are carried out on permaculture water systems as required
		6.4	Erosion and sediment control products and materials are installed in accordance with manufacturers recommendation as required

### Range of Variables

The Range of Variables explains the contexts within which the performance and knowledge requirements of this standard may be assessed. The scope of variables chosen in training and assessment requirements may depend on the work situations available.

What <b>tools, equipment and machinery</b> may be required?	Tools, equipment and machinery may include surveying and levelling equipment such as automatic level, laser level, dumpy level, Cowley level, staff, boning rods, pegs, notebook, pencil and calculator; hand tools such as rakes, shovels, spades, rollers, wheelbarrows, hoses and hose fittings; machinery such as bobcats, ditch witches, backhoes, front-end loaders, graders, mechanical rollers, trucks, hydraulic trailers, and tractors and 3-point linkage equipment; pumps and pump fittings; and fitting and welding tools appropriate to the permaculture water systems.
What <b>permaculture water systems</b> may apply to this standard?	Permaculture water systems may include mains pressure, low pressure, below ground, above ground, spray systems, dripper, and capillary systems and passive systems such as swales, terraces and contour banks.
What <b>permaculture water systems equipment</b> may apply to this standard	Permaculture water systems equipment may include pumps, motors, delivery equipment, sprays, system controllers, injectors, tensiometers, probe tubes, flow meter, pressure gauge, computer and/or other scheduling devices, recycling equipment, and spray equipment.
What <b>enterprise work procedures</b> may apply to this standard?	Work procedures may include supervisors oral or written instructions, installation program, enterprise standard operating procedures (SOP), specifications, routine maintenance schedules, work notes, product labels and Material Safety Data Sheets (MSDS), manufacturers service specifications and operators manuals, waste disposal, recycling and re-use guidelines, and OHS procedures.
What <b>OHS hazards</b> may be associated with the installation of permaculture water systems?	Hazards may include disturbance or interruption of services, solar radiation, dust, noise, soil and waterborne micro-organisms, chemicals and hazardous substances, manual handling, moving vehicles, machinery and machinery parts, uneven surfaces and flying and falling objects.
What <b>materials</b> may be required to install a permaculture water system?	Materials may include permaculture water systems components, glues, welds, construction and backfill materials.

What <b>safety equipment</b> may be required?	Safety equipment may include signage and barriers.
What <b>PPE</b> may be required to install drainage systems?	PPE may include hat, boots, overalls, gloves, goggles, respirator or face mask, face guard, hearing protection, sunscreen lotion and hard hat.
What types of <b>water supplies</b> are covered by this standards?	Water supplies may be underground, mains or surface storage including fixtures such as dams, bores, windmills, tanks, channels.
What <b>OHS requirements</b> may be relevant to this standard?	OHS requirements may include identifying hazards; assessing risks and implementing controls; cleaning, maintaining and storing tools, equipment and machinery; appropriate use of PPE including sun protection; safe operation of tools, equipment and machinery; safe handling, use and storage of chemicals and hazardous substances; correct manual handling; basic first aid; personal hygiene and reporting problems to supervisors.
How may a <b>clean and safe work area</b> be maintained?	Tasks may include disabling unused tools, equipment and machinery and storing neatly out of the way of installation activities; safely storing materials on site; using signage and safety barriers during and removing after construction activities are completed; and swiftly and efficiently removing and processing debris and waste material not for immediate use from the work area.
What <b>waste material</b> may be relevant to this standard?	<p>Waste material may include unused construction and excavated materials, and plant debris, litter and broken components.</p> <p>Plant-based material may be mulched or composted, plastic, metal, paper-based materials may be recycled, re-used, returned to the manufacturer or disposed of according to enterprise work procedures.</p> <p>Waste may be removed to designated areas for recycling, reuse, return to the manufacturer or disposal.</p>
What <b>testing equipment</b> may be relevant to this standard?	Testing equipment may include pressure gauges, flow meters.

## Evidence Guide

### **What evidence is required to demonstrate competence for this standard as a whole?**

Competence in this unit requires that a person can effectively and efficiently install and maintain permaculture water systems according to permaculture principle and enterprise requirements.

The skills and knowledge required to install permaculture water systems must be **transferable** to a different work environment. For example, this could include different types of water systems and components, water supplies, soil types and enterprises.

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#### **What specific knowledge is needed to achieve the performance criteria?**

Knowledge and understanding are essential to apply this standard in the workplace, to transfer the skills to other contexts and to deal with unplanned events. The knowledge requirements for this competency standard are listed below:

- Principles of permaculture
- Methods and techniques of permaculture water systems
- Components of permaculture water systems
- Characteristics and operation of joints, valves and sprinkler components
- Operation of pumps and water flow rates
- Behaviour of water on varying terrain and soil types
- Soil water retention testing techniques
- Water quality and water filtration techniques
- Calculations for installing permaculture water systems
- Soil characteristics
- Enterprise OHS procedures

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#### **What specific skills are needed to achieve the performance criteria?**

To achieve the performance criteria, appropriate literacy and numeracy levels as well as some complementary skills are required. These include the ability to:

- Organise resources for installation work
- Set out and prepare site
- Install permaculture water systems materials and components
- Complete installation work
- Commission permaculture water systems
- Communicate with work team members, supervisors,

contractors and consultants

- Implement and follow relevant enterprise OHS and environmental policies and procedures.

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### What processes should be applied to this competency standard?

There are a number of processes that are learnt throughout work and life which are required in all jobs. They are fundamental processes and generally transferable to other work functions. Some of these are covered by the **key competencies**, although others may be added. The questions below highlight how these processes are applied in this competency standard. Following each question a number in brackets indicates the level to which the key competency needs to be demonstrated where 0 = not required, 1 = perform the process, 2 = perform and administer the process and 3 = perform, administer and design the process.

1. How can <b>communication of ideas and information (1)</b> be applied?	Written, oral and telecommunication of ideas and information with the work group, supervisor, contractors or consultants relating to installation activities and problems.
2. How can <b>information be collected, analysed and organised (1)</b> ?	Enterprise work procedures and site and permaculture water systems plans should be consulted, interpreted and applied to coordinate installation activities with further clarification sought from the supervisor when necessary.
3. How are <b>activities planned and organised (1)</b> ?	Coordinating work activities for the work group, contractors and self prior to and during the installation program.
4. How can <b>team work (1)</b> be applied?	Facilitating and leading work group members to complete the installation to specification.
5. How can the use of <b>mathematical ideas and techniques (1)</b> be applied?	Measuring materials and interpreting specifications for the permaculture water systems installation. Calculation of the water “head” and the capacity of pumping equipment / pipe lengths suitable.
6. How can <b>problem solving skills (1)</b> be applied?	Dealing with problems imposed by site characteristics or when system operation doesn’t meet specifications.
7. How can the <b>use of technology (1)</b> be applied?	Applying design specifications, communicating and keeping records. Selection of energy source for the various alternative pumping devices.

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**Are there other competency standards that could be assessed with this one?**

This competency standard can be assessed on its own or in combination with other competencies relevant to the job function.

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For information about assessing this competency standard for consistent performance and where and how it may be assessed, refer to the **Permaculture International Ltd Course Documentation**.

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