



Install pressurised irrigation systems

AHCIRG331

By the end of this topic, you should be able to:

- Organise resources for installation work
- Set out and prepare site
- Install irrigation components
- Commission irrigation system
- Complete installation work

What is an irrigation system?

- An irrigation system is a system of components which supplies and distributes water.
 - This includes mains pressure, low pressure, below ground, above ground, spray systems, dripper and capillary systems.
 - Systems range from manual operation and monitoring to fully automated with computer control and monitoring

What is an irrigation system?

- A pressurised irrigation system consists of many components, including:

Equipment	Definition
Drip tape	Water distribution system that operates at very low pressure.
Emitter	Two main types: Allow water to seep into the root zone or direct water into the air. Includes pop-up sprinklers.
Filter	Removes debris from systems.
Fittings	Used to join pipes together. Poly fittings have barbed ends which are pushed into the pipes to connect them together.
Gate valve	Used primarily as a shut-off valve, as opposed to flow control.
Master valve	Ensures that at the end of the watering cycle the water is turned off at a central valve.
Poly pipe	Provides an outlet for water to travel through.
Pump	Deliver waters to irrigation system. Ensures consistent water delivery.

Setting up irrigation components

- When setting up irrigation components, you should familiarise yourself with the task requirements:
 - The irrigation plan will determine the scope and requirements of an irrigation job, including:
 - Site location
 - Types and amounts of irrigation equipment required
 - Where existing plans and underground services are located
 - An ASCOM plan will show all wiring, pipes, valves and sprinkler locations (including variations from the original site plans)
 - Speak to your supervisor
 - Apply active listening when receiving instructions
 - Clarify any unclear instructions with your supervisor

Setting up irrigation components

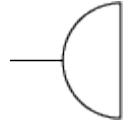
- Some common symbols that may be found on an irrigation plan:



Direction of water flow



Filter



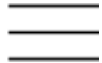
Flushing valve



Gate valve



Micro sprayer



Water source

Setting up irrigation components

- When setting up irrigation components, you should familiarise yourself with relevant workplace information:
 - Identify underground services for the site (e.g. from site plans, supervisor or contacting Dial Before You Dig)
 - For example: Telephone lines, gas, electrical, water, cable
 - Abide by laws applicable to your workplace, such as:
 - Acts [e.g. *Work Health and Safety Act 2011* (Qld)]
 - Regulations [e.g. *Work Health and Safety Regulation 2011* (Qld)]
 - Consider local community requirements (e.g. water restrictions)

Setting up irrigation components

- When setting up irrigation components, you should familiarise yourself with the work area:
 - Identify any WHS hazards and assess risks (e.g. underground services, manual handling injuries)
 - Identify environmental impacts (e.g. waterlogging, soil salination, ecological damage)
 - Report hazards to your supervisor within a timely fashion – especially emergency situations

Workplace risk assessment

- Risk is measured in terms of the seriousness of the possible **consequences** of the hazard and the **likelihood** that those consequences will occur, as in the matrix shown below:

Likelihood

- 1: Very Likely
- 2: Likely
- 3: Possible
- 4: Unlikely
- 5: Very Unlikely

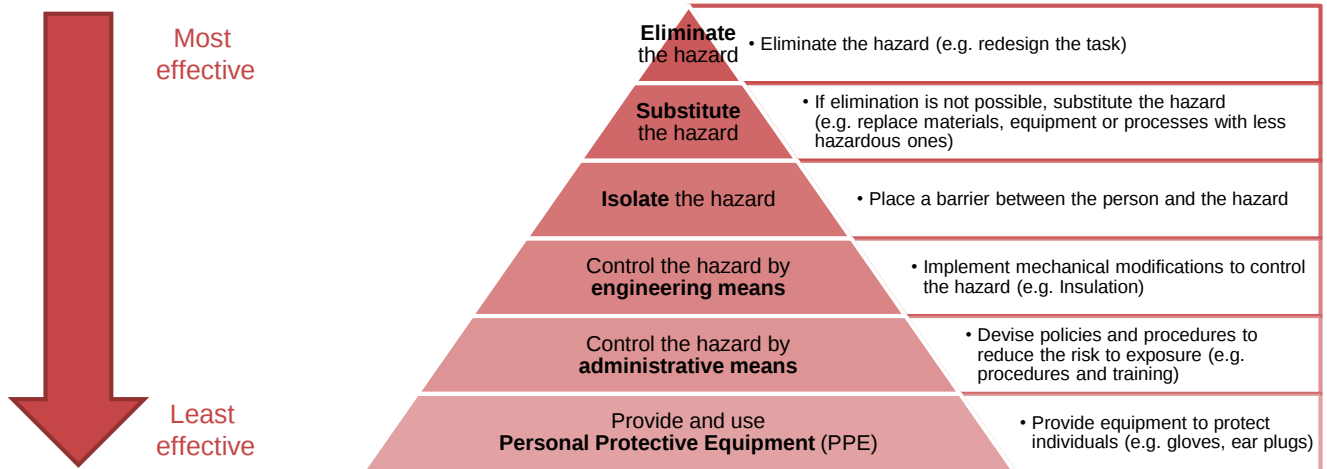
Consequences

- A: Death or Permanent Disability
- B: Serious Injury
- C: Lost Time Injury
- D: Casualty Treatment
- E: First Aid

Matrix	A	B	C	D	E
1	E	E	H	H	M
2	E	H	H	M	M
3	H	H	M	M	L
4	H	M	M	L	L
5	M	M	L	L	L

Workplace risk control

- The hierarchy of control gives priority to the order in which hazard and risk controls should be implemented.



Setting up irrigation components

- When setting up irrigation components, you should organise PPE, tools and equipment:
 - **PPE may include:** Gloves, goggles, gumboots, long sleeved shirt, long trousers, waders, wide brimmed hat, work boots
 - **Safety equipment may include:** Signage and barricades (e.g. safety cones, flagging tape/nets)
 - **Machinery, tools and equipment may include:** Broom, hammer, marking paint, mechanical trenching machine, pipe cutter, rake, rubber mallet, saw, spade, screwdriver, standard shovel, tape measure, thread seal tape, trenching shovel, trowel, wire strippers

Ensure they are appropriately selected, prepared and used for the task, following manufacturer recommendations and enterprise work procedures

- Materials, tools, equipment and machinery are selected according to the irrigation system design requirements
 - When parts and equipment are delivered to site, they should be checked according to the system drawings and specifications
- Check the water supply and ensure it is compatible with the specifications of the system
 - Determine the flow rate before installing irrigation to establish how many sprinklers you can install and what size pipes you should use

Flow rate is the rate at which water flows from a water source
→ $[\text{Quantity (Litres)} \times 60] \div \text{Time (seconds)}$
= Number of litres/minute (flow rate)

- Be sure to check water quality, as this will affect the irrigation system
 - Two issues you may encounter with water quality include:
 - Chemical: Acidic, alkaline, concentrations of certain elements
 - Physical: Algae growth
- Water filtration techniques may be implemented, such as:
 - Disk filters
 - Cartridge filters
 - Centrifugal filters
 - Media filters
 - Screen filters

- When undertaking irrigation tasks, you will likely be working as part of a team (e.g. co-workers and contractors)
- Observe the following tips regarding teamwork:
 - Use clear language and concepts (verbal and non-verbal)
 - Consider the varying cultural and ethnic backgrounds of your co-workers
 - Consider the message you are communicating and the best method to communicate it (e.g. written, verbal)
 - Consider the abilities of your co-workers
 - Observe contractors' work to ensure they understand requirements

- To determine the flow rate from a water source, observe the following steps:
 - Connect plastic pipe to pressure gauge assembly
 - Connect pressure gauge assembly to water source
 - Turn tested gate valve on fully
 - Observe water flowing from source through the pipe
 - Close the gate valve until the pressure gauge reads within the normal operating pressure
 - Insert the pipe into a 9L bucket and start the stopwatch
 - Time how long it takes to fill the 9L bucket
 - Calculate the flow rate using formulae

Assembling an irrigation system

- To assemble an irrigation system, undertake the following steps:
 - **Mark and excavate trenches to the required depth**
 - Mark excavation lines with marker paint and chalk
 - Ensure excavation occurs at the specified depth to avoid damage to services and facilities
 - Avoid damage to features and established plants
 - Avoid placing trench soil onto garden beds which are mulched, as it will be difficult to remove and replace the soil on completion of the job
 - **Place pipes into the trenches and cut to required lengths**
 - Trenches must be sufficiently compacted to avoid divots
 - **Glue fittings to the pipes**
 - Avoid using too much solvent cement, as it can eat through pipe walls and cause joint weakening

Ensure that you keep a clean workspace throughout the installation

- To excavate under a path (i.e. plunking), follow the steps outlined:
 - Choose a spot where the cross-over point is fairly level
 - Ensure you have enough room on one side of the path to lay down the pipe (i.e. twice the length of the pathway)
 - Mark excavation lines for the trench
 - Excavate on one side of the path for the total length of the pipe
 - Place the pipe into the trench
 - Push the pipe into the ground until it appears on the other side of the path

Checking irrigation system

- It is essential to check an irrigation system after installation
 - Check the system configuration and capacity matches the installation plan
 - Check the overall system for any missed cemented joints and incomplete installation
 - Ensure joints are properly sealed using thread seal tape
 - Check that all pipe work is at the same level to ensure efficiency
 - Elevation, slope and orientation of terrain all affect the direction of water flow
 - Ensure that all pipe work is buried to the correct depth
 - Flush the system
 - Force water through the irrigation system using a hose in order to clean out the silt and test each lateral

Testing and monitoring equipment must be calibrated

Checking irrigation system

- To test an irrigation system, undertake the following steps:
 - Open the furthestmost solenoid valve
 - Open the main valve
 - Allow the system to run until the water is clear
 - Turn off the furthestmost solenoid
 - Check for leaks along the mainline, especially around control valves
 - Leave joints exposed until pressure tested
 - Turn off main valve
 - Turn on each station individually using the controller

Follow the start-up sequence specified in the operations manual

- You may encounter a range of issues when testing an irrigation system, such as:
 - No water
 - Check that the main water valve is turned on
 - There may be debris clogging the system (e.g. at valve, sprinkler, or filters)
 - Water leaks
 - Pipes may be broken, cracked or damaged
 - There may be debris clogging the system (e.g. at valve, sprinkler, or filters)

Take corrective actions according to the operation's manual

- As part of completion processes, you should:
 - Finish off earthworks to plan specifications and enterprise work procedures
 - Maintain, clean and store tools and equipment according to manufacturer's specifications
 - Report faults that are discovered
 - Store tools in a dry, sheltered environment
 - Place tools in racks for easy location and safety
 - Store similar tools together for easy access
 - Dispose of materials that cannot be reused or recycled
 - Ensure you implement environmentally safe practices
 - Follow SDS requirements
 - Record and report work outcomes to your supervisor

- Some tips for using an irrigation system:
 - You should monitor irrigation times to deliver sufficient volume without overwatering
 - You may be required to regulate an irrigation system more than once to maintain correct operating pressure and water flow
 - If similar components in a system are starting to break down, you should consider replacing them all rather than repairing them
 - Note that water molecules hold more tightly to the fine particles of a clay soil than to coarser particles of a sandy soil, so clays generally retain more water
 - Soil water content can be measured using a known volume of the material and a drying oven
 - Geophysical sensors are often used to monitor soil moisture continuously in agricultural and scientific applications