

Designing a Watering System

Any good design for a watering system will begin with two things:

- **A Plan** – Drawn to scale with as much information as possible. For this you can use graph paper or download our Design Planner and draw out the design at a scale of 1:100. Show all garden and lawn areas, any paths or driveways, retaining walls and where your taps are located.
- **Your flow rate** – A flow test is important as it dictates how many sprinklers you can run at once. To do this you will need a standard household bucket (9 litres capacity). Remove any tap fittings from the tap you want to use and turn the tap on fully, then place the bucket under the tap and time in seconds how long it takes to fill. If you are going to use more than one tap repeat this process for each tap.

Time to Fill Seconds	Effective Flow rate at approx. 30psi / 210kPa litres / hour
3	9000
4	6750
5	5400
6	4500
7	3855
8	3375
9	3000
10	2700
11	2455
12	2250
13	2075
14	1925
15	1800
16	1685
17	1585
18	1500
19	1420
20	1350
21	1285
23	1175
25	1080
27	1000
30	900

The time it takes to fill the bucket can be converted to a flow rate using this table.

Your flow rate will determine how many popup or garden sprinklers you can operate at one time or how much drip irrigation you can run at any one time; this in turn will determine how many stations or zones you will need to water your property effectively and efficiently.

If you have markedly different flow rates at different taps please mark this on your plan as it may be an advantage to design the system around the tap with the best flow rate. It may be cheaper and easier to cross a path than have two extra zones.

Note that some popup sprinklers use more than 900L/hr so if it takes more than 25 seconds to fill a bucket it may be impractical for you to water your lawn with sprinklers.

Things to remember when designing a system

It is not a good idea to try to water your gardens and your lawns as one zone. Gardens and lawns require different amounts of water and generally do not require watering with the same frequency. The best option is to divide your gardens and lawns up into zones where each zone will require about the same amount of water at about the same frequency.

You cannot put drippers and garden sprayers on the same zone. Drippers range from 1 to 24 litres per hour, whereas garden sprayers range from about 50 to 200 litres per hour, this means that you will get a very different precipitation rate across the zone which will result in uneven water coverage and inefficient water use: basically you will be wasting water.

To design and install an efficient water-wise system, bear in mind the following points.

Lawns

- ‘Head to Head’ coverage – sprinklers should be installed so that one sprinkler sprays onto the adjacent sprinkler. Please see the drawings below which show a 10m x 5m lawn area with 6 sprinkler heads (figure I.1) and one with 2 sprinklers (figure I.2). The first configuration means that there are no dry spots and that due to the overlapping of each sprinklers wetted area the run time for the zone can be reduced. The second has dry spots and so the area needs to be watered for excessive durations to provide water to these dry spots.
- It is better to spray from the edge of lawn and garden areas into the middle. So, it is better to position your sprinklers around the edge. (see figure I.1) If the area is wider than the radius of the sprinklers used, then more sprinklers should be placed in the middle.

Figure I.1 - Efficient Installation

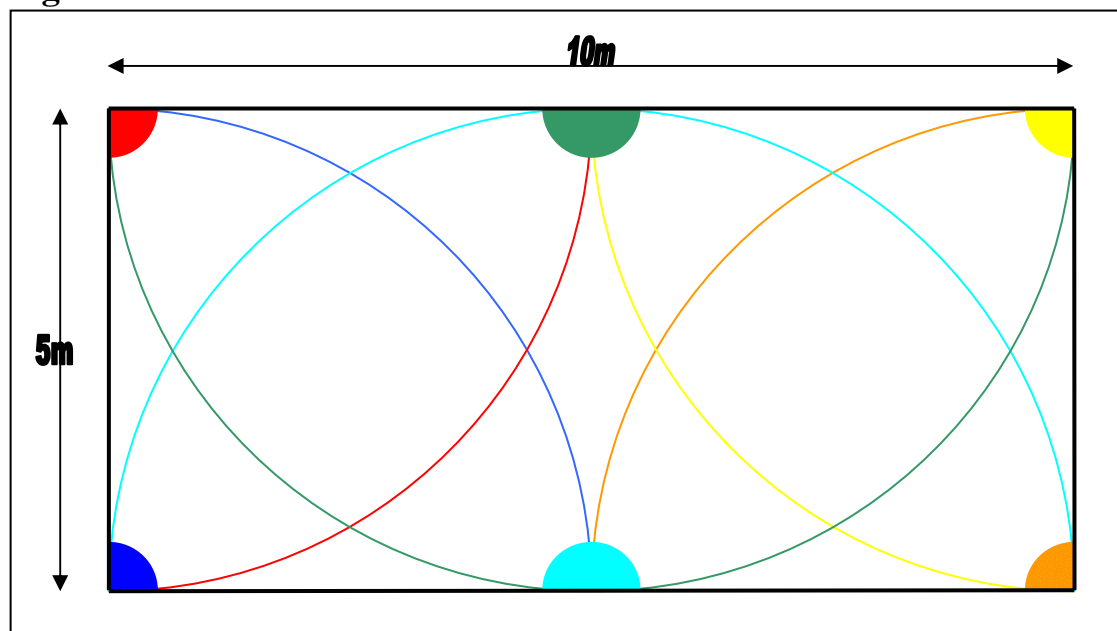
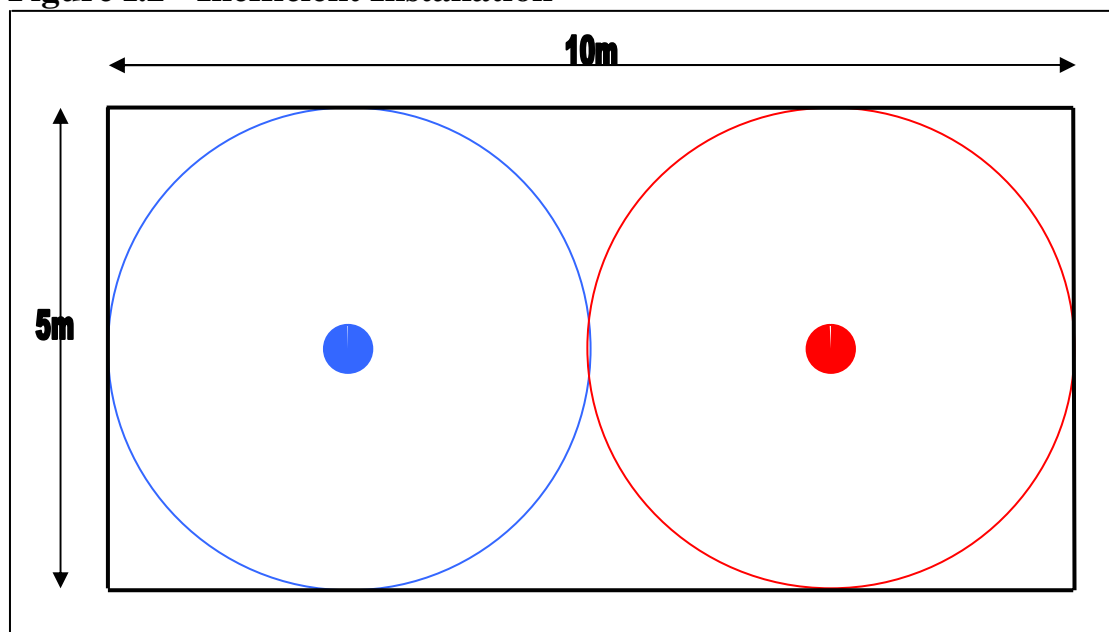


Figure I.2 - Inefficient Installation



- Your lawn and garden areas will probably not be uniform rectangles or squares. So, when you are designing a system, wherever possible, break the areas up into rectangles and squares.
- Gear driven pop up sprinklers and fan popup sprinklers should not be used within one zone. Fan sprays put down approximately 4 times the amount of water as gear drives in the same amount of time. This means that the area that is watered by the gear drives will not receive enough water in the time it takes to water the area with the fan sprays or the area with the fan sprays will be over-watered by the time it takes to water the area with the gear drives.

Gardens

For garden areas we recommend micro-spray sprinklers or dripline.

- **Micro-spray sprinklers**– With some variation due to your flow rate and pressure micro-sprays generally throw a 2m radius and need between 50-70L/hr for each sprinkler. This means that they need to be installed every 2m and your flow rate in litres per hour divided by 70 will give you the maximum number of sprinklers that can be installed on each zone. Micro-sprays should also be installed ‘head to head’.
- **Dripline** – there are many different configurations of in-line drip tube. One example is a flow rate of 2L/hr at 30cm spacing. As a general rule of thumb this dripline should be spaced at 40cm. this means that a run of dripline should be placed in your garden every 40cm. this effectively creates a grid pattern of 30x40cm rectangles with a dripper at each corner.
 - Your soil type will determine the correct spacing with sandy soil requiring closer and clay soil wider spacing.
 - Once the amount of dripline necessary is determined the flow rate can be worked out and the number of zones can be determined.

- Divide the area by the spacing and then multiply this by the drip rate, then divide this number by the dripper spacing to get the flow rate required for the entire system. Then divide that number by the flow rate of your tap and you will have the number of zones necessary (see the following example).

Flow rate from your tap	3000L/hr
Area to be watered	500 m ²
Run Spacing	40cm= 0.4m
Dripper spacing	30cm= 0.3m
Drip rate	2L/hr
$500\text{m}^2 \div 0.4\text{m}$	1250m
So, 1250m of drip line is needed for the area.	
$1250\text{m} \times 2\text{l}/\text{HR} \div 0.3\text{m}$	8333.33L/hr
So, the entire system needs 8334L/hr.	
We have 3000L/hr at the tap	$8334 \div 3000 = 2.78$

So, the system needs to be divided into 3 zones.

- For more information about drip irrigation please see our [Drip Irrigation](#) page.

Automatic or Manual

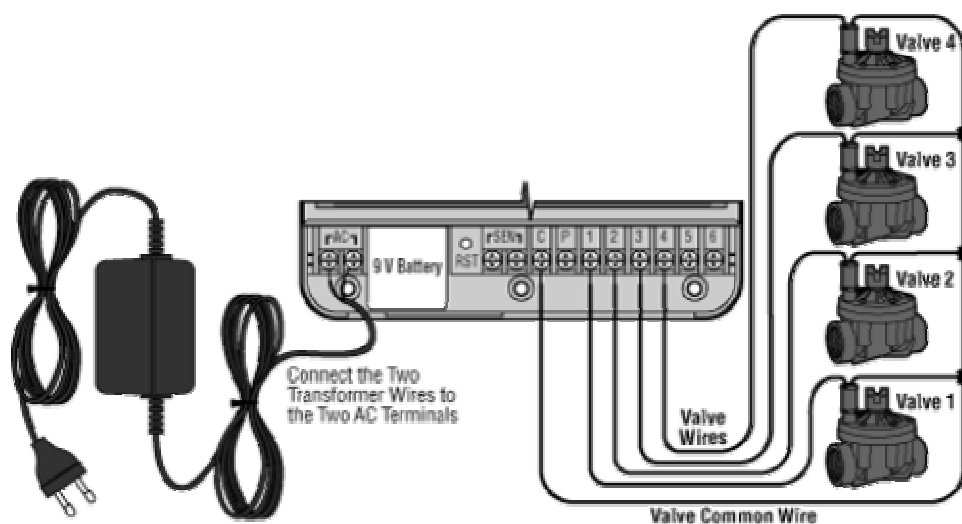
This is entirely up to you, you can spend as much or as little as you like and you can set up the system at a variety of automation levels.

- **Manual System** – this is obviously the cheapest option and as a result it requires the most input from you on a day-to-day basis. You turn the tap on when you want to water and you turn it off when you think the area has had enough water. You will most likely need to build a manifold to allow different zones to be watered individually, if each zone is not connected to a separate tap.
- **Tap Timer** – these are the “egg timer” style timers that most people are quite familiar with. They are inexpensive but they will reduce the flow rate to your system and may require you to reduce the number of spray heads you can use within a zone on your system. Again you will need to build a manifold to allow multiple zones from one tap.
- **Automatic system** – this system will be more expensive but it allows you to water your lawns and gardens at any time of the day whether you are at home or not. It is better to water late in the evening or early in the morning and an automatic system allows you to do this with ease. It also allows you to fit a rain sensor which will not allow the system to come on if it is, or has recently been, raining. An automatic system will require a controller and solenoid valves with multi-core cable joining the controller to the valves.

Wiring up an Automatic System

- Irrigation controllers put out a 24V AC current; this is safe to be buried in your garden and can even be buried in the same trench as your irrigation lines. It can be put in conduit but it is not necessary to do so.
- To wire up a controller you need to connect one wire from the common connection in the controller to each of the solenoids. Second, you need to connect an individual wire from each of the numbered stations to each of the valves. (see diagram V.1 – diagram courtesy Hunter Industries) For a more detailed explanation of how valves are wired up please go to [Hunter Industries](#) support page.

Figure V.1



- It is important to use water resistant wire joiners such as Scotchlocks (make this a hotlink). If you do not use a water resistant wire joiner then over time the wire will corrode and your system will not work.

If you require any further information regarding designing or installing irrigation systems please do not hesitate to contact our friendly sales staff at Dural Irrigation by phone on 02 9651 4111 or by email to customerservice@duralirrigation.com.au.

You can now go ahead and design and install an efficient watering system and more importantly gain maximum enjoyment from your garden.