



## Efficient irrigation for water conservation guideline



#29044

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# 1. Important regulatory information

This document is the Efficient Irrigation for Water Conservation Guideline as referred to in Part 8 of the Queensland Plumbing and Wastewater Code (The Guideline).

Definitions are used throughout the Guideline and defined terms are listed in Schedule 1. Please ensure you read Schedule 1 (at the back of the Guideline) as the definitions contain important information.

## 1.1 Queensland Plumbing and Wastewater Code

The Queensland Plumbing and Wastewater Code requires all outdoor irrigation systems, installed or replaced on or after 1 March 2009 in homes and one-storey units (Class 1 and Class 2 buildings) in Queensland areas serviced by a Water Service Provider, to comply with the Guideline when:

- a. connected to a water service; or
- b. connected to a rainwater tank where the rainwater tank has a continuity of supply from a water service through either:
  - (i) a trickle top-up system ; or
  - (ii) an automatic switching device where the off take is located downstream of the automatic switching device.

## 1.2 Water Restrictions

Check with your local water service provider for water restrictions that may apply in your local area

Queensland Water Commission water restrictions apply in the South East Queensland (SEQ) areas of:

- Brisbane City Council
- Gold Coast City Council
- Ipswich City Council
- Lockyer Valley Regional Council
- Logan City Council
- Moreton Bay Regional Council
- Scenic Rim Regional Council
- Somerset Regional Council
- Sunshine Coast Regional Council
- Redland City Council

In these areas, you may use efficient irrigation on your lawn and garden within set times and only in accordance with these guidelines.

# 2. Application of The Guideline

Efficiency levels for urban outdoor irrigation systems and sprinklers apply to:

- the use of water from a reticulated (town) supply system for watering gardens and lawns in SEQ residential and non-residential premises
- watering devices – what you can use to water (section 3)
- operating requirements – how you can water (section 3)
- watering periods – how long you can water (section 5)

The Guideline also contains information to help you:

- calculate how much water your garden actually requires (section 5)
- plan your garden and irrigation system (section 5.5)
- understand how much water emitters and sprinklers use (Appendix B)
- meet water consumption targets under restrictions (section 7)

The Guideline provides a framework for water-wise gardening and lawn maintenance to allow residents to enjoy their gardens, lawns and outdoor lifestyle while ensuring water is used efficiently, wisely and responsibly. If planning to use town water in an efficient irrigation system, you must ensure that your system and/or sprinklers comply with the Guideline. Alternate sources such as rainwater, bores and greywater are not restricted.

For SEQ, there are additional requirements for non-residential premises where the area to be irrigated exceeds 500 square metres. Check [www.qwc.qld.gov.au](http://www.qwc.qld.gov.au) for more information.

## 2.1 How compliance can be demonstrated

Compliance with the Guideline and water restriction requirements can be demonstrated by:

- using an efficient irrigation system and/or efficient sprinkler (section 8)
- watering you garden or lawn in accordance with the permitted hours set out in the water restrictions for your local area (section 14)
- adopting water efficient gardening and lawn management practices (section 9)
- using water in accordance with the Guideline

## 3. Efficient irrigation requirements

### 3.1 Efficient irrigation system

An efficient irrigation system must have the following features:

- a network of permanent piping connected to emitters which has been designed and installed to water a specific landscape area
- the maximum output capacity of each emitter within the irrigation system must not exceed 9 litres/min\*; and
- the irrigation system must be fitted with either:
  - a manual timer with a maximum range of two hours; or
  - an automated timer, used with a soil moisture sensor or rain sensor to prevent the system operating during rain or where the soil already holds adequate moisture to sustain plant growth
- where drip-line is used it must be pressure-compensated and consist of permanent plastic tubing which has inline or internal emitters (inside the hose) spaced at regular intervals of at least 30 cm
- drippers may only be used for lawn irrigation where certified by a Certified Irrigation Professional
- the use of an efficient irrigation system must be in accordance with the operating requirements and watering times determined by the QWC (for SEQ) or by your local Council (for residents outside SEQ).

\*A Certified Irrigation Professional is permitted to certify an irrigation system as an efficient irrigation system using emitters with a different flow rate, provided the system is fit for purpose and delivers the same or better water efficiency outcomes when used in accordance with this Irrigation Guideline.

Refer to Appendix B for more information on different emitter outputs.

### 3.2 An efficient sprinkler

Sprinklers are attached to the end of a garden hose and are generally moved around the garden or lawn from time to time to cover the area to be watered. To be an efficient sprinkler, the device must:

- be non-fixed
- have a maximum output capacity which does not exceed more than 9 litres of water per minute
- be capable of connection to a standard garden hose or permanent piping of 15 mm diameter or less
- be connected to and used in conjunction with a timer
- have an adjustable distribution pattern so that hard surfaces are not watered
- be used in accordance with the operating requirements and watering times determined by the QWC (for SEQ) or by your local Council (for residents outside SEQ).

### 3.3 Operating requirements

An efficient irrigation system or efficient sprinkler must be operated efficiently to conserve water. When watering gardens and lawns by any means, you should:

- apply water at a rate so that it does not ponds, pools or runs off
- not apply water when the soil is already adequately moist to sustain plant growth, whether as a result of rain or other watering
- apply water in such a manner so that it does not fall on buildings or hard surfaces and run to waste
- use a manual timer with a maximum timing capability of 30 minute with an efficient sprinkler
- not apply water in windy conditions where the distribution pattern of the irrigation or sprinkling systems will be affected
- apply water only to gardens that are sufficiently mulched to reduce evaporation
- apply water to only lawns that have been laid on a soil underlay with a minimum depth of at least 100mm

## 4. Helping you make efficient choices – Smart Approved WaterMark

The QWC has worked with Smart Approved WaterMark and the irrigation, nursery and garden industries to assist you to identify water efficient devices and water wise gardening practices required by the Guideline.

Smart Approved WaterMark is Australia's national, not-for-profit labelling scheme for products and services that help to reduce water use outdoors and around our homes. It is the sister scheme to the Water Efficiency Labelling and Standards (WELS) scheme which allows consumers to compare the water efficiency of different indoor products and appliances.

The Guideline identifies irrigation products that display the Smart Approved WaterMark, so look for this sign when selecting irrigation products.



For more information on Smart Approved WaterMark products visit [www.smartwatermark.org/products](http://www.smartwatermark.org/products)

## 5. Efficient gardening practices

### 5.1 Understanding how much water your garden and lawn requires

It's easy to over water gardens and lawns if we don't understand how little water the garden or lawn actually requires. Just because you can water for a certain period each week, doesn't mean your garden or lawn actually requires this volume of water. Depending on the type of efficient irrigation system or efficient sprinkler you have, you may only need to run it for a very short-time before the required amount of water is delivered to your garden or lawn.

You can find out how much water your garden and lawn requires by:

- doing the water meter test
- finding out the precipitation rate of your irrigation system

To find out the output rate of your emitters, you should run the water meter test.

#### The water meter test:

1. Read your water meter.
2. Making sure no other water is being used on the premises, run your irrigation system for five minutes using a timer.
3. Read your meter again and subtract the first reading from the second reading to find out the total number of litres used by your irrigation system in five minutes.
4. Divide this number by five and then divide this number again by the total number of emitters you have connected to your system. This is the average output of your emitters in litres per minutes.

For example:

Litres used by system in 5 minutes = 200 litres

$$\frac{200 \text{ litres}}{5 \text{ mins}} = 40 \text{ litres/min for system}$$

$$\frac{40 \text{ litres/min}}{10 \text{ devices}} = \text{an average of 4 litres/min per device}$$

## 5.2 Precipitation rate

Precipitation rate means the volume of water (in litres) applied by the efficient irrigation system to a defined area (square metres) over a specified period of time (minutes).

As a guide:

- a well-designed garden may only require around 10 mm of water each week to sustain growth
- a water smart lawn will require even less water – as little as 6 mm in summer when it is growing and 3mm in winter when it is dormant

This volume of water includes any rainfall your garden may have received.

The volume of water required for your garden or lawn will depend upon your soil and plant type(s) (section 11). You should seek advice from your local horticultural specialist or nursery.

## 5.3 The precipitation rate of your irrigation system

You can use the following calculation to work out the approximate precipitation rate at which your irrigation system is delivering water to your garden or lawn.

### Precipitation rate calculation

Precipitation rate (mm/hour) =  $\frac{\text{total flow rate (litres/hour)}}{\text{total area to be irrigated (square metres)}}$

For example:

$$\frac{(5 \times 6 \text{ litres per minute emitters}) \times 60 \text{ minutes}}{\text{Area to be irrigated } 20 \text{ square metres}} = \frac{1,800 \text{ litres per hr}}{20}$$

Precipitation rate is of this system is 90 mm/hour.

To find long to operate this system to apply 10 mm of water:  $\frac{60 \text{ minutes}}{90 \text{ mm}} = 7 \text{ minutes}$

This is a general calculation only and doesn't take into account the specifics of every garden or lawn. Refer to the case studies in Appendix A- Precipitation Rate-Case Studies for more information.

## 5.4 Take note of the rainfall your garden and lawn receives

If your local area has recently received significant rainfall (more than 50 mm) it may be weeks before you need to water again.

You must have a soil moisture sensor or rainfall sensor connected to your efficient irrigation system. This will prevent the system operating if the soil already has adequate moisture or if it is raining. There are two ways in which you can determine the volume of rainfall your garden receives each week:

1. Install a rainwater gauge
2. Check the rainfall figures from the nearest Bureau of Meteorology (BOM) weather station closest to your house at [www.bom.gov.au](http://www.bom.gov.au)

## 5.5 Apply water correctly

To ensure your garden and lawn is receiving the maximum volume of water from your irrigation system or sprinkler and water is not being wasted, you should ensure your emitters are:

- applying water only to the root zone of the plant, where the plant can actually use it
- spaced to ensure adequate and even distribution of water or as otherwise recommend by the manufacturer
- adjusted so that you are not watering buildings or other hard surfaces such as paving

Seek advice from your irrigation professional and/or your horticultural specialist or nursery when designing or installing a system.

## 5.6 Alternative water sources

More than a third of households in SEQ now have a rainwater tank and many households have been using rainwater for some time to sustain their garden. Always use rainwater before using your town water to irrigate.

Some households also use greywater on their garden and lawns. This can save thousands of litres of town water each year, but there are requirements associated with the use of greywater around the home. For example household greywater must not be sprayed or used in your irrigation system or sprinkler.

The Department of Environment and Resource Management has information sheets on the use of greywater in the garden, which can be sourced from [www.derm.qld.gov.au](http://www.derm.qld.gov.au)

## 5.7 Know your garden and lawn

Every garden and lawn is different – from the plants you have chosen, to the soil you have and the wind and sunshine your garden receives. It is likely that different parts of your garden will have a different microclimate and may therefore have different watering requirements.

## 5.8 Know your soil type

Different soils retain different volumes of moisture as demonstrated in the table below.

Soil type	Sand	Loam	Clay
Water (mm stored in 20 centimetre depth of soil)	12 mm	42 mm	28 mm

If you have sandy soil, you will know that it retains relatively little water and therefore plants growing in sandy soils are likely to require more water to survive. However, applying more than 12 mm of water on sandy soil at a time is a waste of water, because it will simply drain through, past the root zone.

You should consult your local horticultural specialist about how to improve sandy or poorer soils. Some tips and options include:

- replacing the soil with better quality loam
- treating the soil with a wetting agent or using water crystals
- adding organic matter such as compost
- using plants which thrive in sandy soils, such as coastal plants and some Australian native plants

The Department Environment and Resources Management has further information on understanding your soil type which can be sourced from [www.derm.qld.gov.au](http://www.derm.qld.gov.au)

If you are still unsure of your soil type or how to improve it, take a sample along to your local nursery or landscaping specialist and seek advice. Also, ask about the water retention properties of potting mix next time you're buying it as there are significant differences between products.

## 5.9 Planning your garden

When planning a new irrigation system or modifying an existing system you should select the system and emitters which are efficient and appropriate for your:

- microclimate
- plant selection
- soil type of your garden

For example, drippers are an excellent and water-wise irrigation option for most gardens, but may not be suitable for sandy soils.

You should consult your local irrigation professionals, horticultural specialist or nursery to determine which system(s) are right for your garden.

Your irrigation specialist may design a different type of system for different parts of your garden. As outlined in section 6, your emitters should be planned and placed appropriately in order to water effectively. Take a simple plan of your garden along to your local retailer or irrigation specialist so that they can help you design a system which will distribute the right amount of water in the right places.

## 5.10 Choosing the right plants

If you are re-planting or planning a new garden, you should choose plants which have a low water requirement and are likely to thrive in the specific conditions in your garden such as exposure to sun, wind and soil type. Remember, it is a good idea to group plants which have similar watering requirements, so that you can irrigate more effectively.

Your local horticultural specialist or nursery can assist you to select the plants which are right for you and your local area – refer to the references in section 15 of the Guideline.

## 5.11 Mulch your garden

Mulch is excellent for your garden. Common types of mulch include woodchips, straw, shredded plant materials and pebbles. A minimum depth of 5 cm and even coverage is required. A greater depth may be required to reduce evaporation effectively in your garden. This depends on the type of mulch used. Check with your horticultural specialist or nursery for more information.

If you use organic mulch which breaks down quickly, top it up several times a year.

Drip-line systems are designed to sit beneath mulch or in the soil to reduce evaporation and ensure more water goes directly into the soil and to plant roots. Ask your irrigation professional or retailer for more advice on how to use these systems effectively when using mulch.

## 6. Water-smart lawn

The depth and quality of soil beneath your lawn dramatically influences the water retention properties of your lawn and its' ability to withstand dry periods.

The Queensland Turf Producer's Association recommend a minimum depth of 100mm of quality soil underlay meeting the Australian Standards for landscaping and garden use AS 4419-2003. The make-up of the underlay should consist of:

- Quality loam with sand, silt and clay components
- Organic matter/ humus

Ask your accredited turf supplier for more information on how to achieve a water-smart soil underlay.

If your existing lawn has been laid on rubble or other poor quality materials, it will not thrive in the longer-term, particularly in times of drought. It may be best in these circumstances to re-lay turf after a suitable underlay has been prepared.

When relying on builders or landscape contractors to plant a new lawn, you should make sure they comply with the Guideline by using quality underlay of a minimum depth of 100mm. Add organic matter or wetting agents to your lawn after planting to improve its' soil retention properties.

### 6.1 Choose water efficient turf varieties

When planting a lawn for the first time, make sure you choose a warm-season variety.

There are a variety of commercially-available grasses belonging to the grass species below which can be grown under a range of conditions. These species are well-suited to the SEQ climate and use significantly less water than other grasses:

- Buffalo grass
- Couch grass
- Zoysia grass

Ask your accredited turf supplier to recommend a water-efficient variety to suit your property.

### 6.2 Maintaining a water-smart lawn

Now that you have laid your new water-efficient lawn species on a suitable underlay, you should ensure your lawn is maintained in a water efficient manner. Only water your new lawn when it actually needs watering and in the periods and on the days permitted in the water restrictions. This will ensure your lawn can cope with dry conditions. Signs that your lawn is ready for watering include:

- changing colour
- the soil below is difficult to penetrate using a sharp object
- your lawn doesn't spring back after being walked on



A water-smart lawn requires very little water to maintain it in good condition – only 6mm a week in summer and 3mm a week in winter. Depending on rainfall, you may only need to run an efficient irrigation system or an efficient sprinkler for between 10 and 20 minutes per week to achieve this application. Unlike many plants, lawn can remain dormant for some time during periods of drought and quickly spring back to life after rain.

If you observe bright green patches or the presence of fungus (toadstools) or moss, you may be over-watering. By watching your lawn, you will soon get a feel for how often and when you need to water throughout the year. Do not water your lawn during winter as your lawn is dormant during this period.

If you have a large area of lawn to be irrigated consider installing an efficient irrigation system designed to water the entire area evenly. Attempting to move an efficient sprinkler around a large area may result in areas of overlap (soaked lawn) and dry patches

Improve the water-penetration properties of your soil by regular aerating and applying organic material or wetting agents so that more water reaches lawn roots.

## Fertilising

Apply fertiliser during the spring and summer months when there is higher rainfall and your lawn is actively growing. Use small amounts of an organic fertiliser as this will require far less water post-application than a chemical fertiliser.

## Mowing

Mowing your lawn incorrectly will result in it quickly drying out and needing more water. When mowing your lawn you should:

- keep your lawn at a height of at least 3cm and only cut when necessary; and
- mow outside of the heat of the day when your newly cut lawn will simply dry out.

# 7. Meeting restriction consumption targets

## 7.1 Water restrictions

Water restrictions are in force in many areas of Queensland and you must comply with restriction requirements when watering your garden and lawn (where this is permitted under restrictions).

Make sure you only water during the permitted times under the current level of restriction applicable in your local area. If in doubt check with your Council or, for SEQ residents you can also check the QWC's website at [www.qwc.qld.gov.au](http://www.qwc.qld.gov.au).

Where water restrictions provide a period in which you can water your garden or lawn, you must only water for the time it takes to meet the water use needs of your garden or lawn. Remember, use only what you need.

## 7.2 Consumption targets

A residential water use target is in place for SEQ residents under Permanent Water Conservation Measures. Check with your water supplier for consumption targets in effect in your local area.

It's important that we monitor and manage our water use to ensure excessive amounts of water aren't used. In general, Target 200 can be achieved by restricting household outdoor water use to around 1.5 hours per week in total.

When choosing when and how to use water outdoors, you should consider how much water different outdoor activities typically require. The table on below provides some examples.

Activity	Flow Rate <sup>2</sup> (litres per minute)	Usage (minutes per week)	Total litres used/week
Using a high-pressure cleaning device	7-9	10	90 litres
Hosing continuously with a trigger nozzle	18-20	15	270-300 litres
Washing vehicles – using a bucket and continuously hosing for 5 minutes using a trigger or twist nozzle	18-20	5	100 litres
Topping up a pool or spa using a hose (without trigger or twist nozzle)	24	10	240 litres

<sup>2</sup> Approximate flow rate – devices vary in efficiency

## 7.3 Calculating how long to operate your efficient irrigation system

The amount of time you need to water by operating an efficient irrigation system or efficient sprinkler depends on what device or systems you use. Calculate the period you need to operate your efficient irrigation system by using the calculation in the box below.

Period of Operation Calculation
$\frac{T}{\text{Discharge volume of your watering devices (litres/ min)} \times \text{Number of devices in your system}}$
<p>T = outdoor volumetric water use target for your household per week (e.g. 1400 litres for 4 person household) – any other outdoor water use activities.</p>

## 8. Further Information

The following Industry, State Government and Local Council information resources will assist you in planning and maintaining your garden and lawn.

Local Councils often provide gardening and horticultural information specific to your local area. The list of Councils below is not exhaustive, so check the website of your local Council.

Organisation	Website Address
A number of innovative irrigation products are available to consumers. Check the Smart Approved Watermark website at:	<a href="http://www.smartwatermark.org">www.smartwatermark.org</a>
Irrigation Australia Limited Your Guide to Good Garden Watering available at:	<a href="http://www.irrigation.org.au">www.irrigation.org.au</a>
Irrigation Australia Limited – information on Certified Irrigation Professionals who can provide competent design, installation and auditing services:	<a href="http://www.irrigation.org.au">www.irrigation.org.au</a>
The Queensland Turf Producers Association (QTPA) at:	<a href="http://www.qtpa.com.au">www.qtpa.com.au</a>
The Nursery and Garden Industry Australia available at:	<a href="http://www.lifeisagarden.com.au">www.lifeisagarden.com.au</a>
The Savewater Alliance at:	<a href="http://www.savewater.com.au">www.savewater.com.au</a>
Queensland Water Commission (QWC) at:	<a href="http://www.qwc.qld.gov.au">www.qwc.qld.gov.au</a>
The Department of Environment and Resource Management have a range of publications for waterwise gardening available at:	<a href="http://www.derm.qld.gov.au">www.derm.qld.gov.au</a>
Brisbane City Council has a number of useful articles on plants and gardening tips, specifically for the Brisbane climate at:	<a href="http://www.ourbrisbane.com.au">www.ourbrisbane.com.au</a>
The Gold Coast City Council has developed the Garden Watersaver specifically for the Gold Coast climate which is available at:	<a href="http://www.goldcoast.com.au">www.goldcoast.com.au</a>
Ipswich City Council has a number of useful waterwise gardening publications available at:	<a href="http://www.ipswichwater.com.au">www.ipswichwater.com.au</a>
The Sunshine Coast Regional Council provides the Sunshine Coast WaterWise Gardening Handbook. Available at:	<a href="http://www.sunshinecoast.qld.gov.au">www.sunshinecoast.qld.gov.au</a>

## Schedule 1 – Definitions

Schedule 1 defines particular words that are used in the Guideline. Unless a contrary intention appears, definitions used in the *Water Act 2000* and in QWC's Water Restrictions apply to the interpretation of this *Efficient Irrigation for Water Conservation Guideline*:

**Certified Irrigation Professional** means a person who has attained nationally recognised qualifications in irrigation and achieved certification through Irrigation Australia Limited (IAL).

**drip-line** means a piping system which has in-line or internal dripper inserted manually or during manufacturing

**efficient irrigation system** means a system designed to:

- a. use water efficiently within the volume and time limits set by Restrictions to maintain a healthy, functional garden or lawn without exceeding the water requirements of the garden or lawn; and
- b. operate in accordance with the Commission *Efficient Irrigation for Water Conservation Guideline*.

**efficient sprinkler** means a non-fixed watering device that is designed to:

- a. attach to a hose;
- b. be moved around in order to irrigate a garden or lawn;
- c. use water efficiently within the volume and time limits set by Restrictions to maintain a healthy, functional garden or lawn without exceeding the water requirements of the garden or lawn; and
- d. must operate in accordance with the Commission *Efficient Irrigation for Water Conservation Guideline*.

**emitter** means a device of any kind fitted on a network of permanent piping which is operated under pressure to discharge water in a spray, mist or drip form. Common types of emitters include drippers, micro-sprayers, pop-up and gear-drive sprays and fixed sprinkler heads.

**garden** is defined as any outdoor ground used for the cultivation of, or in which there are situated trees, shrubs, flowers, plants, vegetables, or vegetation of any kind including plants in pots or tubs and excluding lawn.

**hand held hose** means a hose fitted with a trigger nozzle or twist action nozzle that is held by hand when it is used.

**lawn** means an outdoor expanse of grass-covered land that is usually associated with a garden, but does not include active playing surfaces (such as sports grounds).

**mulch** means any material used to cover the surface in and around plants designed to retain moisture and reduce evaporation.

**precipitation rate** means the volume of water (in litres) applied by the efficient irrigation system to a defined area (square metres) over a specified period of time (minutes).

**pressure-compensated** means the ability of the drip-line to maintain the same emission rate over a range of pressures.

**rain sensor** means a device that prevents an irrigation system from being operated during, or soon after rainfall.

**reticulated (town) supply system** means a system of water distribution infrastructure operated by a service provider delivering potable (drinking quality) water to premises in the local government area of the service provider, directly to the premises through the distribution system or indirectly to the premises in a water tanker or other container containing water that has been sourced from the reticulated supply system; the system also includes a rainwater tank which contains any water sourced from the reticulated water supply system including rainwater tanks employing a trickle top-up system. However, the system does not include a rainwater tank that is connected to a house via an automatic switching valve for the purpose of maintaining supply to internal toilet cisterns, washing machine cold water taps or other fixtures specified in a local planning instrument where stored rainwater is sourced directly from an outlet from a tank or upstream from the automatic switching valve.

**soil moisture sensor** means a device that measures the amount of residual moisture or water in the soil. It prevents irrigation systems from being used when the soil is already wet.

## APPENDIX A – Precipitation Rate- Case Studies

### Case Study 1 – where manufacturer specification is given in L/min

Mrs Smart irrigates a garden area of 18 m<sup>2</sup> using six emitters. The manufacturer's specifications on the emitters state that each emitter has an output of 6 L/min. The combined flow rate from the six emitters in Mrs Smart's irrigation system = 6 emitters x 6 L/min each = 36 L/min.

Mrs Smart can divide the combined flow rate from the six emitters by the garden area of 18 m<sup>2</sup> to determine the precipitation rate of her irrigation system. Thus 36 L/min ÷ 18 m<sup>2</sup> garden area = 2 mm/min.

Should Mrs Smart's garden require only 10mm of precipitation in each irrigation event, then the length of time that Mrs Smart needs to run her irrigation system to get the right amount of water on her garden can be determined by dividing the 10mm required by the precipitation rate of her irrigation system (2 mm/min). Thus 10 mm ÷ 2 mm/min = 5 minutes of irrigation time required.

### Case Study 2 – where manufacturer specification is given in L/hour

Mrs Smart irrigates a garden area of 18 m<sup>2</sup> using six emitters. The manufacturer's specifications on the emitters state that each emitter has an output of 360 L/hour. The combined flow rate from the six emitters in Mrs Smart's irrigation system = 6 emitters x 360 L/hour each = 2160L/min.

Mrs Smart can divide the combined flow rate from the six emitters by the garden area of 18 m<sup>2</sup> to determine the precipitation rate of her irrigation system. Thus 2160 L/min ÷ 18 m<sup>2</sup> garden area =120 mm/hour.

Should Mrs Smart's garden require only 10mm of precipitation in each irrigation event, then the length of time that Mrs Smart needs to run her irrigation system to get the right amount of water on her garden can be determined by dividing the 120 mm/hour by 60 minutes = 2 mm/min, which requires five minutes of irrigation run time equal 10 mm precipitation.

Important calculations to keep in mind:

- Precipitation rate (mm/hr) =  $\frac{\text{total flow rate (L/hour)}}{\text{Total area (m}^2\text{)}}$
- Irrigation run time (mins) = precipitation needed (mm) ÷ precipitation rate (mm/min)
- Irrigation run time (hours) = precipitation needed (mm) ÷ precipitation rate (mm/hour)

Conversely, if Mrs Smart's rain gauge indicates 10mm or more of rainfall on her garden in the last week, then Mrs Smart has no need to turn on her irrigation system.

## APPENDIX B - Emitter and efficient sprinkler output

There is a wide range of emitters (including drippers, micro-sprayers, pop-up and gear-drive sprays and fixed sprinkler heads) which will achieve 9 litres or less per minute. For example:

- a. Most drippers use between 2 and 8 litres per hour. This means they only use 0.13 litres each per minute.
- b. Micro-sprayers generally use between 0.4 – 2.5 litres per minute.
- c. Medium to low sized gear drive or pop-up fixed sprinklers/ sprayers generally use around 7 or 8 litres per minute.

If you have an existing irrigation system where the emitters exceed the output capacity permitted under this Irrigation Guideline, you will need to replace the emitters so that they discharge less than the required 9 litres/ minute. Changing emitters can usually be undertaken easily and cost effectively. For additional guidance and advice, please contact your irrigation professional or hardware specialist on the appropriate irrigation solution for your system.






If you already have an existing irrigation system and are unable to find out the output rate of your emitters, you should run The Water Meter Test (Page 5).

Most good quality irrigation products and emitters will have their output capacity in either litres/min or litres/hour clearly shown on their packaging or at point of sale.

When shopping, look for water efficient irrigation products that carry the Smart Approved WaterMark and beware of products where the output capacity or the Smart Approved WaterMark is not clearly shown.



You can also look for information such as shelf labels or brochures displayed near irrigation products and emitters. You may be able to find information on emitter flow rates from the manufacturer's website or by asking your irrigation professional or hardware retailer.

Efficient irrigation system emitters	Output Range	Example Emitter	Example of how to achieve Target 200 (litres per person per day) if all of weekly outdoor water use allocation is used for watering garden or lawn		Example Precipitation rate <sup>3</sup>
			Persons per household		
			2 (700L)	4 (1400L)	
Drippers 	2 litres/ hour to 8 litres/ hour; or 0.03 litres/min to 0.13 litres/min.	8 litres/ hour	87 emitters for one hour	174 emitters for one hour	10 mm per hour if spaced 80 cm apart
Micro-sprayer 	25 litres/ hour to 150 litres/hour; or 0.4 litres/min to 2.5 litres/ min.	25 litres/ hour	112 emitters for 15 mins	224 emitters for 15 mins	10 mm per 50 min if spaced two metres apart
75 litres/ hour		37 emitters for 15 mins	74 emitters for 15 mins	10 mm per 15 min if spaced two metres apart	
125 litres/ hour		22 emitters for 15 mins	44 emitters for 15 mins	10 mm per 10 min if spaced two metres apart	
Fixed sprayers (including pop-up sprinklers and gear drives) 	4 litres/ min to 8 litres/min.	4 litres/ min	17 emitters for 10 mins	34 emitters for 10 mins	10 mm per 10 min if spaced four metres apart
6 litres/ min		11 emitters for 10 mins	21 emitters for 10 mins	10 mm per 7 min if spaced four metres apart	
8 litres/ min		8 emitters for 10 mins		10 mm per 5 min if spaced four metres apart	
Drip-line pressure-compensated (50 metres) 	0.66 litres/ metres /min to 1.16 litres/ metres/min; or 33 litres to 58 litres/min for 50 metres	1.6 litres/hr at 40 cm spacing	50 metres for 20 mins	100 metres for 20 mins	10 mm per 15 min for 50 metres
2.1 litres/hr at 30 cm spacing		50 metres for 12 mins	100 metres for 12 mins	10 mm per 10 min for 50 metres	
Efficient Sprinkler	Output Range	Example	Example of how to achieve Target 200 Efficient watering of gardens and lawns (weekly)		
	1.18 litres/min to 6.4 litres per minute	7 litres/min	2 x 30 minute periods per week @ 7 litres per minute will use 420 litres.		2 x 30 minute periods per week @ 9 litres per minute will use 540 litres

<sup>3</sup> Sample figures provided as an example only, check with your irrigation specialist or retailer.

