



*every drop counts*

# Commercial Stock and Production Areas Water Efficiency Management Plan

## Nurseries, Turf Farms and Market Gardens

### Water Efficiency Management Plan for Nurseries, Turf Farms and Market Gardens using less than 10ML per year

This document is intended to be used by Nurseries, Turf Farms and Market Gardens as defined by the QWC (Queensland Water Commission) Water Restrictions to demonstrate compliance specific to the 10.1 water use category.

Ipswich Water, as the Water Service Provider, is responsible for implementing and enforcing the QWC Water Restrictions and related legislative requirements. This includes the WEMP (Water Efficiency Management Plan) program.

#### DECLARATION

*I declare that the information given in this Water Efficiency Management Plan is true and correct.*

SUBMISSION DETAILS		
<b>WEMP Author</b>		Print the name of the person preparing this WEMP submission
<b>Organisation</b>		Print the name of the organisation they are representing
<b>Authorisation</b>		Print the name of the person who authorises the WEMP on behalf of the business or non-residential property
<b>Authority's Position</b>		Print the position within the business or organisation of the person authorising the WEMP
<b>Authority's Signature</b> By signing you agree to the conditions below		
<b>Date</b>		

#### Conditions to Authority's Signature

The Customer (water account holder):

- will implement the water saving measures in the Water Efficiency Management Plan and do all things necessary to have its employees and contractors implement the water saving measures
- acknowledges that Council may modify the Water Efficiency Management Plan
- acknowledges that Council may enforce the water saving measures

## BUSINESS INFORMATION

### BUSINESS DETAILS

Name	
ABN	
Rateable Property Address	
Assessment Number (if known)	
Number of Staff/Employees	

### CONTACT DETAILS

Primary Contact for WEMP	
Position in Company	
Alternate Contact Person and Position in Company	
Phone Number	
Mobile Number	
Fax Number	
Email Address	
Mailing Address	

## WATER EFFICIENCY MANAGEMENT PLAN CHECKLIST

Please make sure the following sections have been completed prior to submitting your WEMP to Ipswich Water.

WEMP CHECKLIST		
STEP 1	Fill in baseline information for your business	<input type="checkbox"/>
STEP 2	Measurement and monitoring	<input type="checkbox"/>
STEP 3	Detection of leakage and management of pressure	<input type="checkbox"/>
STEP 4	WEMP - water saving actions	<input type="checkbox"/>

### STEP 1 - BASELINE INFORMATION

Please indicate the sources of water used at your site:

- Mains                       Bore                       Treated Wastewater  
 Stormwater                       Rainwater Tank                       Dam  
 River/Stream                       Other (please describe)

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## RECENT WATER USE

Water Consumption (kL)	2005-2006	2006-2007	2007-2008
<b>Total town water consumption</b> <i>If you do not record this information you should be able to obtain it from your annual rates notice.</i>			
<b>Total water consumption</b> <i>If you use other sources such as dam water or rainwater, include them here. Provide an estimate if not metered.</i>			
<b>Total annual commercial output</b> <i>Use the most appropriate unit for your business, eg m<sup>2</sup> turf, number of plants, kg of produce or \$ turnover per year.</i>			
<b>Water consumption per productive unit</b> <i>[eg kL/m<sup>2</sup> turf, kL/plant, kL/kg produce, kL/\$ turnover]</i>			

### Do you recycle and/or recapture any of your water?

No
  Yes (please provide details)

### Have you previously implemented water saving initiatives?

No
  Yes (please provide details)<sup>2</sup>

### Do you already have a WEMP in place?

No
  Yes (supply WEMP ID Number if known)

### Have you completed any water efficiency/management courses (eg through industry associations)?

No
  Yes (please provide details)

### Has a water audit previously been carried out on your business?

A water audit is an independent assessment of your water consumption, which assesses the amount of water used in different areas of your business and helps find ways to improve water efficiency.

No
  Yes (please provide details)

<sup>1</sup> Measuring water consumption per unit of production is a useful way of assessing water efficiency and takes into account growth or shrinkage in the business. If your business grows, your total water consumption may increase even if you have implemented water saving initiatives, however your water consumption per unit of production will decrease showing the improvements in your water efficiency.

<sup>2</sup> Water saving initiatives may include completion of the 'Home Water Wise' service (if you have home based operations).

## STEP 2 - MEASUREMENT AND MONITORING

Please provide details of meters measuring the quantity of water used on your premises.

Table 2.1

Meter ID	Location	Frequency of Reading
1		
2		
3		

If there is a residence on your premises, a suitable metering arrangement needs to be in place to enable water used for domestic purposes to be accounted separately from water used by Nursery, Turf Farm and Market Garden activities.

## STEP 3 - DETECTION OF LEAKAGE AND MANAGEMENT OF PRESSURE

Leakage can account for as much as 10 to 30 per cent of water use on a site. Please undertake the following exercise to assess leakage at your site.

For each meter identified in Table 2.1, select a time when no water use is expected, eg at night or after hours/weekends. Read the meter at the start and record the reading. After a suitable time has passed (at least one hour) record the meter reading. If the meter is showing that some water has been used, this is an indication that there is a leak in that area.

Table 3.1 Leakage Checks

Date of Leak Check	Meter ID	Initial Reading	Second Reading	Time Between Readings	Leakage Detected

Actions planned or taken to address any leaks identified are to be outlined in WEMP - Water Saving Actions (Table 4.1).



## STEP 4 - WEMP WATER SAVING ACTIONS

Use the template on the following page to record the details of your WEMP - Water Saving Actions. In this table you are required to list the actions you plan to undertake in the next year to improve water efficiency, if not already at 'best practice'. Corresponding to each action you should indicate the date that you expect it to be completed.

Following this template is Table 4.2 which lists suggested water saving options that may be relevant to your business. Further options that are not described here may also be included. Brief descriptions, including information to help you estimate potential water savings, are provided to help you determine whether the option is suitable for your business. Additional useful sources of information are listed at the end of the Table.

The actions in your WEMP are categorised as:

- awareness
- measurement and monitoring
- reducing water usage

You are required to specify and implement at least one action under each category. If your business is already achieving best practice, list actions or practices that you have in place.

### **Awareness**

These actions improve the level of awareness and knowledge of water efficiency issues in your business. Examples include making staff aware of the costs of water use, communicating water use figures to employees and making specific staff members responsible for water conservation efforts.

### **Measurement and Monitoring**

These actions assist you to better understand where water is being used in your business and help you assess the effects of water saving initiatives. An example would be installation of additional water meters to accurately measure and identify areas of your business that may be inefficient and require improvement.

### **Reducing Water Usage**

These actions help you reduce the water consumption of your business. Examples include installation of water saving nozzles, and use of soil moisture to dictate watering schedules and changes in watering schedules. This section should also include any actions you undertake to monitor and repair leakage. The options you select will depend on the characteristics of your business and the budget and staffing available to you.

Before adopting any measures, ensure that you have considered their suitability to your business, their associated costs, and the likely water savings you will achieve.<sup>3</sup>



<sup>3</sup> The business is bound to implement items outlined as WEMP Water Saving Actions. Items outlined should be realistic and achievable for the business.



Suggestions for saving water in Nurseries, Turf Farms and Market Gardens.

Table 4.2

Efficiency Improvement Option	Potential Savings/Comments
<b>Awareness</b>	
Appoint a staff member to manage water conservation as part of their daily duties.	
Regularly communicate the costs of water usage and the financial savings associated with water efficiency initiatives (eg monthly reports of water consumption and costs).	
Provide staff training in water conservation (eg Irrigation Association of Australia or Nursery and Garden Industry Queensland).	The Nursery and Garden Industry Queensland ( <a href="http://www.ngiq.asn.au">www.ngiq.asn.au</a> ) and The Irrigation Association of Australia ( <a href="http://www.irrigation.org.au">www.irrigation.org.au</a> ) both provide training in water efficiency.
Ensure that staff report and act upon leaks and wasteful practices. Implement a procedure for reporting and repairing maintenance faults promptly.	<ul style="list-style-type: none"> <li>• One drip per second can waste 7,000 L/y<sup>4</sup></li> <li>• Worn nozzles can waste 30 per cent of water<sup>5</sup></li> <li>• A 1mm hole under pressure of about 400kPa can waste 3,000 L/d (1,150 kL/y)<sup>6</sup></li> </ul>
Encourage staff to provide suggestions for improving water efficiency (eg through monthly water efficiency meetings).	
<b>Measurement and Monitoring</b>	
Install additional water meters to monitor water consumption in different areas of the business (eg for different groups of plants).	Ipswich Water provides guidance on how to read water meters (see Sources of Useful Information Number 12).
Keep records (eg monthly) of trends in water consumption in different areas of the business.	
Implement regular (eg weekly) inspections of equipment for leaks or faults. Check for leaks by taking water meter readings during 'downtimes' (ie periods of little or no water use).	
Use 'catch cans' to assess the evenness of irrigation (ie uniformity). An array of cans is placed in the area being irrigated, the system is turned on and the application from the system is caught in the cans. At the end of a fixed period of time the amount of water in the can is recorded and the application rate in millimetres per hour can be estimated. The rates are then compared to estimate uniformity. <sup>7</sup> Rearrangement or modification of irrigation systems may be possible to increase efficiency.	<ul style="list-style-type: none"> <li>• Savings of 23 to 36 per cent were found using a catch can test in two ovals in Western Australia in early 2004<sup>8</sup></li> <li>• The Nursery Industry Association of Australia recommends a Coefficient of Uniformity of greater than 85 per cent<sup>9</sup></li> <li>• Consult the Nursery and Garden Industry Queensland (<a href="http://www.ngiq.asn.au">www.ngiq.asn.au</a>) or the Irrigation Association of Australia (<a href="http://www.irrigation.org.au">www.irrigation.org.au</a>) for further advice</li> </ul>
Use pressure gauges to monitor water mains and sprinkler delivery pressure. Supply pressure should be matched to your irrigation systems. Too much pressure leads to evaporation loss through misting and uneven application. Too little pressure causes poor distribution.	Consult manufacturer specifications for guidance on recommended operating parameters such as spray pressure.

<sup>4</sup> Sydney Water (2005) *Water Conservation - Best Practice Guidelines for Clubs*, Sydney Water, Sydney South. [www.sydneywater.com.au/Publications/\\_download.cfm?DownloadFile=FactSheets/BPGsForClubs.pdf](http://www.sydneywater.com.au/Publications/_download.cfm?DownloadFile=FactSheets/BPGsForClubs.pdf)

<sup>5</sup> Sydney Water (2005) *Fact Sheets - Spray Nozzles*, Sydney Water, Sydney South. [www.sydneywater.com.au/Publications/\\_download.cfm?DownloadFile=FactSheets/SprayNozzles.pdf](http://www.sydneywater.com.au/Publications/_download.cfm?DownloadFile=FactSheets/SprayNozzles.pdf)

<sup>6</sup> P2pays.org (2005) *Water Efficiency - Auditing Methodology and Tools*, North Carolina Department of Environment and Natural Resources, Division of Pollution Prevention and Environmental Assistance, Raleigh NC, USA. [www.p2pays.org/ref/04/03108.pdf](http://www.p2pays.org/ref/04/03108.pdf)

<sup>7</sup> Wilson, T, and Zoldoske, D (1007) *Evaluating Sprinkler irrigation Uniformity*, Center for Irrigation Technology, California Agricultural Technology Institute, Fresno, USA. [www.cati.csufresno.edu/cit/rese/97/970703/](http://www.cati.csufresno.edu/cit/rese/97/970703/)

<sup>8</sup> Cape, J (2005) *'Irrigation Technology - Urban, Landscape Irrigation Saves Water'*, Irrigation Australia, Winter 2005, Vol 20, No 2, pp 13-15.

<sup>9</sup> Savewater.com.au (2005) *How to Save Water in the Nursery Industry*, Savewater.com.au, Mitcham. [www.savewater.com.au/default.asp?SectionId=36&SortTag=33](http://www.savewater.com.au/default.asp?SectionId=36&SortTag=33)

Efficiency Improvement Option	Potential Savings/Comments
<b>Measurement and Monitoring</b>	
<p>Implement a monitoring program for other factors that will help to assess irrigation efficiency – eg soil moisture, theoretical and actual precipitation rate (mm/h), Distribution Uniformity Coefficient, Christiansen Coefficient of Uniformity, Scheduling Coefficient, and Irrigation Index.</p>	<ul style="list-style-type: none"> <li>Monitoring in a nursery in South Australia found that 40 per cent of irrigation water ended up as excess water<sup>10</sup></li> <li>Consult the Nursery and Garden Industry Queensland (<a href="http://www.ngiq.asn.au">www.ngiq.asn.au</a>) or the Irrigation Association of Australia (<a href="http://www.irrigation.org.au">www.irrigation.org.au</a>) for further advice</li> <li>The Nursery Industry Association of Australia recommends a Coefficient of Uniformity of greater than 85 per cent, a Mean Application Rate of less than 15mm/h, and a Scheduling Coefficient of less than 1.5<sup>6</sup></li> <li>Also see Sources of Useful Information (Numbers 8 and 9) for recommended monitoring parameters</li> </ul>
<b>Reducing Water Usage</b>	
<p>Redesign your irrigation system and scheduling taking into account factors such as site layout, operating pressures, rainfall, seasonal variations, plant varieties, soil properties and climate.</p>	<p>The Nursery and Garden Industry Queensland (<a href="http://www.ngiq.asn.au">www.ngiq.asn.au</a>) and The Irrigation Association of Australia (<a href="http://www.irrigation.org.au">www.irrigation.org.au</a>) both provide training in water efficiency.</p>
<p>Link monitoring (from 2. Measurement and Monitoring) to automatic control systems.</p>	<p>A semi-automated irrigation system linked to evaporation sensors helped a South Australian nursery improve water use efficiency from 63 to 83 per cent.<sup>11</sup></p>
<p>Water early morning or late evening instead of during the day.</p>	<p>Savings up to 25 per cent possible.<sup>12</sup></p>
<p>Install control timers or automatic shutoff systems.</p>	<p>Sprinklers can use up to 1,000L/h.<sup>8</sup></p>
<p>Water less frequently but more deeply.</p>	
<p>Zone irrigation areas to ensure that plants do not receive more water than they need. Group plants according to water requirements.</p>	
<p>Use soil amendments such as compost or mulch to improve water holding capacity.</p>	
<p>Change watering schedules as required (eg monthly) to take into account seasonal variations.</p>	
<p>Ensure optimum positioning and selection of sprinklers to prevent wasteful overspray onto buildings, roads or footpaths. For example, the use of part circle sprinklers on rectangular fields to prevent watering outside the field area.</p>	
<p>Promote drought tolerant varieties of turf grass and water only as required.</p>	<p>Possible savings of up to 30 per cent of water needs.<sup>13</sup></p>
<p>Consider filtering, cleaning and recycling irrigation water.</p>	

<sup>10</sup> SA EPA (2005) *Cleaner Production Case Study – Heyne’s Wholesale Nursery*, Environment Protection Agency, Government of South Australia, Adelaide. [www.epa.sa.gov.au/cp\\_heyne.html](http://www.epa.sa.gov.au/cp_heyne.html)

<sup>11</sup> SA EPA (2005) *Cleaner Production Case Study – Heyne’s Wholesale Nursery*, Environment Protection Agency, Government of South Australia, Adelaide. [www.epa.sa.gov.au/cp\\_heyne.html](http://www.epa.sa.gov.au/cp_heyne.html)

<sup>12</sup> Sydney Water (2005) *Fact Sheets – Outdoor Areas*, Sydney Water, Sydney South. [www.sydneypwater.com.au/Publications/\\_download.cfm?DownloadFile=FactSheets/SavingWaterOutdoorAreas.pdf](http://www.sydneypwater.com.au/Publications/_download.cfm?DownloadFile=FactSheets/SavingWaterOutdoorAreas.pdf)

<sup>13</sup> CRC for Irrigation Futures (2005) *A National Implementation Program to Improve Urban Irrigation Efficiency and Reduce Outdoor Water Use*, CRC for Irrigation Futures, Darling Heights. [www.irrigationfutures.org.au](http://www.irrigationfutures.org.au)

## Reducing Water Usage

Investigate the possibility of changing to a more efficient irrigation system. If properly managed and maintained, drip irrigation uses 30 to 50 per cent less water than sprinkler irrigation and usually costs less to install. Since water is applied directly to the root zone, evaporation and runoff are minimised.<sup>14</sup>

In nurseries, consider bottom watering systems, eg capillary mats, sand beds or troughs, which minimise water use and result in little or no water runoff. Consider also pulse watering systems which allow potting mix to absorb more water thus reducing excess irrigation.

For turf, investigate the use of in-line drip systems.

Irrigation System	Application Efficiency <sup>15*</sup>
<b>Sprinkle Systems</b>	
Centre Pivot	75% - 85%
Solid Set	65% - 75%
Wheel-line	60% - 70%
Hand-line	60% - 70%
Big Gun/Traveller	55% - 65%
<b>Micro-Irrigation Systems</b>	
Drip	85% - 90%
Micro-sprinklers	75% - 85%
<b>Surface/Gravity Systems</b>	
Rill	45% - 60%
Rill with Tailwater Reuse on Same Field	70% - 85%
Surge Flow	60% - 70%
Surge Flow with Tailwater Reuse on Same Field	75% - 90%

\* The fraction of water leaving the sprinkler that is used by the plants.

Use brooms instead of water for cleaning. Hosing of hard surfaces is prohibited under Medium Level Water Restrictions.

One hour of unnecessary hosing per day can waste between 470kL and 940kL of water per year.<sup>16</sup>



<sup>14</sup> Bilderback, T E and Powell, M A (1996) *Efficient Irrigation*, North Carolina Cooperative Extension Service, Publication Number: AG-508-6. [www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag508\\_6.html](http://www.bae.ncsu.edu/programs/extension/publicat/wqwm/ag508_6.html)

<sup>15</sup> WSU (2001) *WSU Drought Advisory: Irrigation System Evaluation*, Washington State University, Pullman, WA, USA. [www.cru.cahe.wsu.edu/CEPublications/em4822/em4822.pdf](http://www.cru.cahe.wsu.edu/CEPublications/em4822/em4822.pdf)

<sup>16</sup> UNEP Working Group for Cleaner Production (2004) *Eco-Efficiency Toolkit for the Queensland Food Processing Industry*, Australian Industry Group, Spring Hill. [www.geosp.uq.edu.au/emc/CP/Food\\_Project/About\\_the\\_project.htm](http://www.geosp.uq.edu.au/emc/CP/Food_Project/About_the_project.htm)



## SOURCES OF USEFUL INFORMATION

1. The Nursery and Garden Industry Queensland ([www.ngiq.asn.au](http://www.ngiq.asn.au)) runs workshops on water efficiency and employs staff to handle water efficiency related queries.
2. The Irrigation Association of Australia ([www.irrigation.org.au](http://www.irrigation.org.au)) provides training programs and certified auditors to assess the efficiency of irrigation systems.
3. IAA (2004) Certified Irrigation Auditor Program – Landscape – Resource Manual, Irrigation Association of Australia Limited, Hornsby Westfield. [www.irrigation.org.au/index.html](http://www.irrigation.org.au/index.html)
4. NIAA & HRDC (1997) Nursery Industry Water Management – Best Practice Guidelines, Nursery Industry Association of Australia & Horticultural Research & Development Corporation.
5. Rolfe, Currey, Atkinson (1994) Managing Water in Plant Nurseries, Horticultural Research & Development Corporation, Nursery Industry Association of Australia and NSW Agriculture.
6. Rolfe, C, Yiasoumi, W and Keskula, E (2000) Managing Water in Plant Nurseries, NSW Agriculture, Orange.
7. Cresswell, G and Huett, D (1996) Managing Nursery Runoff: Techniques to Reduce Nutrient Leaching from Pots, NSW Agriculture and Horticultural Research & Development Corporation, Wollongbar.
8. Connellan, G (2002) Efficient Irrigation: A Reference Manual for Turf and Landscape, Burnley College, University of Melbourne. [www.southeastwater.com.au/sewl/upload/document/WaterConManual.pdf](http://www.southeastwater.com.au/sewl/upload/document/WaterConManual.pdf)
9. NGIQ (2005) Guidelines for Managing the Environment, An Environmental Management System for the Australian Nursery Industry - Production Nurseries & Growing Media Suppliers – Environmental Target Values, Nursery and Garden Industry of Queensland, Salisbury.
10. Qld EPA (2003) Queensland Guidelines for the Safe Use of Recycled Water, Queensland Environmental Protection Agency: Brisbane. [www.epa.qld.gov.au/environmental\\_management/water/safe\\_use\\_of\\_recycled\\_water](http://www.epa.qld.gov.au/environmental_management/water/safe_use_of_recycled_water)
11. Center for Irrigation Technology, California Agricultural Technology Institute, Fresno, USA. [www.cati.csufresno.edu/cit/index.html](http://www.cati.csufresno.edu/cit/index.html)
12. Ipswich Water, How to Read Your Water Meter [www.ipswichwater.com.au/about\\_us/publications/](http://www.ipswichwater.com.au/about_us/publications/)



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