



Government of **Western Australia**
Department of **Water**

Looking after all our water needs

Strategic policy 2.03 – Managing unlicensed groundwater use

(Previously Statewide policy no. 14 – Managing unlicensed groundwater use)

August 2009

Department of Water

168 St Georges Terrace
Perth Western Australia 6000
Telephone +61 8 6364 7600
Facsimile +61 8 6364 7601
www.water.wa.gov.au

© Government of Western Australia

August 2009

Reference details

This work is copyright. You may download, display, print and reproduce this material in unaltered form only (retaining this notice) for your personal, non-commercial use or use within your organisation. Apart from any use as permitted under the *Copyright Act 1968*, all other rights are reserved. Requests and inquiries concerning reproduction and rights should be addressed to the Department of Water.

The recommended reference for this publication is: Department of Water 2009 *Strategic policy 2.03 – Managing unlicensed groundwater use*, Department of Water, Perth.

Series no. DWPF 2.03.

ISSN 1836-9618 (online)

ISBN 978-1-921675-31-7(online)

Acknowledgements

This report was prepared by the Water Licensing Branch of the Water Resource Use Division of the Department of Water after a draft policy on managing unlicensed groundwater use was released for public review between 13 October 2008 and 15 November 2008.

The comments presented by the department staff and members of the public to assist with the development of the policy are gratefully acknowledged.

For more information about this policy, contact:
Program Manager, Water Licensing Policy.

Summary

This policy outlines the Department of Water's approach for managing unlicensed groundwater use.

Licensing the take and use of groundwater under the *Rights in Water and Irrigation Act 1914* is the main tool for managing the use of the state's groundwater resources. However, not all water taking activities are licensed. Licensing very low-yielding bores such as domestic or garden bores that have a minor impact on the groundwater resources is not cost-effective and may not deliver the desired management outcomes.

The department will manage unlicensed groundwater use through:

- regulations
- public awareness and education campaigns
- working with industry
- where necessary, providing financial incentives.

The department will set aside sufficient water to account for the water taken from unlicensed groundwater users, before allocations are made to licensed water users – thus ensuring sustainable outcomes.

The department will regularly review how it manages the unlicensed groundwater users and the resources they access. If management practices do not deliver the desired outcomes, or water resources are under significant stress, the department will increase its management effort. This may include introducing more regulations that, in specific areas, may require all groundwater users to be licensed.

Contents

Summary	iii
1 Policy statement	1
2 Background	2
2.1 Issue	2
2.2 Intent	2
2.3 Legislation	2
3 Implementation	4
3.1 Application	4
3.2 Activities the department may not licence	4
3.2.1 Irrigation of household gardens in urban areas	4
3.2.2 Household and garden use in rural properties	5
3.2.3 Stock watering bores under non-intensive conditions	6
3.2.4 Small dewatering projects	6
3.2.5 Occasional groundwater uses	6
3.2.6 Water taken under Commonwealth legislation	6
3.3 Alternatives to licensing	6
3.3.1 Raising community awareness	7
3.3.2 Regulations	8
3.4 Water quality issues	9
3.4.1 Acid sulfate soils	9
3.4.2 Contaminated sites	9
3.4.3 Saline water interface	10
3.5 Increasing the management effort where required	10
3.6 Setting aside water for unlicensed groundwater use	11
3.7 Construction of unlicensed bores	13
3.8 Water use efficiency	13
4 Review	15
Glossary	17
References	19
Regional enquiries	20

Figures

Figure 1	Allocating the groundwater resources	12
----------	--	----

Tables

Table 1	Indicative water use from domestic bores	13
---------	--	----

1 Policy statement

The Department of Water will tailor the effort of managing the state's water resources to the significance of those resources to the community, the environment they support and the desired management outcomes. As a result, not all groundwater users will be licensed.

The Department of Water will manage unlicensed groundwater use to ensure that:

- groundwater resources are not overexploited
- risk to the environment and groundwater users is minimised
- public expectations of accessing the groundwater systems are met
- groundwater is utilised efficiently and effectively
- unlicensed groundwater use is accounted for.

It will do this by:

- raising public awareness of the issues associated with unlicensed use
- reserving a volume of water to account for unlicensed use
- drafting by-laws, and Orders in Council
- introducing water efficiency measures
- encouraging industry to adopt best management practices.

2 Background

2.1 Issue

The Department of Water (the department), the state's primary water resource management agency, ensures our water resources are managed effectively within sustainable limits. The department grants access to groundwater resources by granting licences under the *Rights in Water and Irrigation Act 1914*. Licensing is appropriate to manage larger scale commercial activities that are likely to have an impact on the local environment, but may not be the most suitable tool for managing other groundwater taking activities. For example, licensing may not be appropriate for very small groundwater users, such as domestic bore owners (that have a minor effect on the environment when compared with higher yielding bores) or for occasional water uses, such as firefighting.

There is also a community expectation that land owners will be able to access groundwater resources for domestic purposes with few restrictions. In addition, several Commonwealth government agencies are exempt from state legislation, such as the *Rights in Water and Irrigation Act 1914*.

The department will adopt a variety of approaches to deliver desired management outcomes when managing unlicensed groundwater users. To be successful, these approaches must consider the activity to be managed and the characteristics of the local environment and hydrogeology.

2.2 Intent

The policy outlines the department's position in managing and accounting for the unlicensed groundwater use in Western Australia.

The intent of this policy is to meet sustainable outcomes by:

- identifying the types of activities the department may not license
- adapting management practices to specific groundwater resources and circumstances
- protecting the environment by ensuring the groundwater resources are not overexploited
- accounting for the groundwater drawn from unlicensed groundwater users
- ensuring that unlicensed groundwater users utilise the water responsibly
- ensuring the state's groundwater resources are managed cost-effectively.

2.3 Legislation

The *Rights in Water and Irrigation Act 1914*, (the Act) establishes the legislative framework for managing and allocating water resources in Western Australia. Under the Act, the right to the use, flow and control of the water in watercourses, wetlands

and underground water sources is vested in the Crown. The Department of Water is responsible for discharging the specific water resource management powers and functions set out in the *Rights in Water and Irrigation Act 1914*.

The Act requires all artesian bores to be licensed for their construction (under section 26D) and the take of water (under section 5C). Non-artesian bores in proclaimed groundwater areas must also be licensed under sections 26D and 5C.

The Act also provides for exempting some groundwater activities from licensing by an Order under section 26C, or through by-laws under section 26L.

Although water resource management is the responsibility of individual states and territories, Commonwealth legislation related to the establishment and operation of Commonwealth agencies overrides state legislation. As such, Commonwealth agencies such as the Department of Defence and the Federal Aviation Authority are generally exempt from licensing under the *Rights in Water and Irrigation 1914*.

3 Implementation

3.1 Application

This policy applies to unlicensed groundwater use throughout the state. It supersedes earlier policies or practices associated with managing and accounting for unlicensed groundwater use adopted by the Department of Water from time to time.

3.2 Activities the department may not licence

The department will consider adopting management approaches, other than licensing, in areas where:

- there are significant groundwater resources present
- the risk to the environment presented by unlicensed activities is minimal
- the risk to the water resource and other water users is minimal
- the public's expectations of accessing the groundwater systems are met
- these approaches are effective and more cost-efficient than licensing
- there is no need to secure water entitlements for these groundwater users
- groundwater quality issues are able to be addressed and managed.

The department will generally not license the taking of groundwater from the water table aquifer for the following activities.

3.2.1 Irrigation of household gardens in urban areas

The large volumes of easily accessible fresh groundwater found under many of the state's towns and cities has encouraged the installation of large numbers of low yielding domestic bores irrigating household gardens. Such bores are also referred to as 'garden bores' since they are used solely for irrigating domestic lawns and gardens.

In Perth, more than 150 000 domestic bores in Perth tap the water table (unconfined) aquifer (compared with less than 15 000 water licences being managed statewide by the department). These bores significantly reduce the demand on scheme water. An estimated 120 gegalitres (GL) of groundwater per year are pumped from these domestic bores, equivalent to one-quarter of all groundwater taken from the Perth region.

Domestic bores in urban areas provide a second-class water supply system by recycling the excess groundwater that has been introduced into the aquifer as the result of urbanisation. In urbanised areas, as the native vegetation is cleared (decreasing evapotranspiration losses), and as roads, houses and parking lots are introduced – the amount of runoff from rainfall is increased. In Perth, much of this increased runoff is concentrated into compensation basins and soak wells that recharge the water table aquifer.

If properly located and used, domestic bores in urban areas offer several advantages including:

- reducing the demand on the public water supply system by using untreated groundwater to irrigate household gardens, instead of highly treated scheme water
- minimising environmental impacts by spreading groundwater abstraction over a large area, rather than taking the same volume of groundwater from a small number of high yielding bores
- reducing the need to source more costly water supply options
- reducing drainage requirements
- maintaining the garden industry, especially during periods of severe watering restrictions
- maintaining the value to householders of domestic gardens.

However, in some areas the unrestricted construction and use of domestic bores has the potential to impact on the environment adversely by:

- lowering water levels in wetlands
- increasing groundwater acidity in areas of acid sulfate soils
- inducing the saltwater interface in coastal areas to migrate inland
- abstracting contaminated groundwater if a bore is located near a contaminated site
- causing staining in areas where the groundwater contains high concentrations of iron.

The department has developed a map showing the areas around Perth that are suitable for the construction and use of domestic bores. Other government departments such as the Department of Environment and Conservation and the Department of Health have additional information to assist individuals when making a decision to construct a bore.

3.2.2 Household and garden use in rural properties

Domestic bores servicing rural and rural lifestyle properties generally take more groundwater than domestic bores located in urban areas. This is due mainly to the larger size of the lawns and gardens and the provision of irrigated pasture for domestic animals.

Where potable scheme water is not available, domestic bores also provide the potable water requirements for household use. The department strongly advises that domestic bore owners seek advice from the Department of Health before using the groundwater from bores for drinking purposes or for filling swimming pools. The Department of Health's guidance note *Using bore water safely* provides additional information to users of unlicensed groundwater on the issues related to water quality. The guidance note is available from the Department of Health website.

3.2.3 Stock watering bores under non-intensive conditions

The agriculture industry is a major component of the state's economy. Groundwater used to provide drinking water for stock held under intensive conditions is licensed. The *Rights in Water and Irrigation Act 1914*, defines the watering of stock under intensive conditions as:

Conditions in which the cattle or stock –

- a. are confined to an area smaller than that required for grazing under normal conditions; and
- b. usually fed by hand or by mechanical means.

There are also numerous small low-yielding bores, usually powered by windmills that provide drinking water for stock held under non-intensive conditions. Such bores are not licensed. The isolation of such bores and the relatively small volumes of water they take does not usually pose a risk to the local environment or the groundwater resources.

3.2.4 Small dewatering projects

There are occasions where the construction of small projects such as sewage pumping stations or the placement of structural pylons for construction purposes, will require the dewatering of small volumes of water. These activities are generally limited in duration (less than seven days) and, in most cases, the dewatered groundwater is directed back into the aquifer.

3.2.5 Occasional groundwater uses

Occasional groundwater uses such as for firefighting purposes or during the construction and test-pumping of new bores, are also activities that are unlikely to threaten the water resources or the environment. Such activities may take relatively small volumes of groundwater over very short periods of time – varying from a few hours to a couple of days.

3.2.6 Water taken under Commonwealth legislation

Certain government agencies operating under Commonwealth legislation or on land that is vested to the Commonwealth government, have the right to take water without needing to obtain a permission to do so from the relevant state or territory. Agencies such as the Department of Defence or the Federal Aviation Authority have the right to take water for activities related to their purpose, from land vested to them, generally without needing to obtain a licence under the state's *Rights in Water and Irrigation Act 1914*.

3.3 Alternatives to licensing

Using approaches for managing low yielding bores other than licensing, has several advantages including:

- The groundwater taken from unlicensed bores may be estimated using other means, such as surveys. These are as effective as and considerably more cost-efficient than licensing small individual water users.
- The cost of licensing large numbers of low yielding bores is prohibitive (it is not considered a good use of public resources).
- Licensing may unnecessarily restrict or delay some short-term activities without benefiting the overall management of the water resource.

The management approaches will vary depending on the circumstances and on specific water resource management issues. Generally, these fall into two broad categories – those related to raising community awareness and those that require regulation.

3.3.1 Raising community awareness

The department has adopted a range of community awareness management approaches including:

Media-based	• Newspaper articles informing the community of the issues related to having and operating domestic bores and the need to use water wisely. • Internet-based information from the departments of Water, Environment and Conservation, and Health. • Local newspaper articles discussing area-specific groundwater issues. • Pamphlets discussing domestic bores and groundwater use. • Television advertisements, where necessary.
Incentives and penalties	• When necessary, providing financial incentives to construct and use domestic bores in areas deemed to be suitable. • Introducing penalties, through regulations, to domestic bore owners who overwater. • Policing the restrictions placed on the use of garden bores and where necessary imposing appropriate fines (for example, on the times of watering).
Industry involvement	• Having close contact with groundwater drilling contractors and their associations. • Supplying drilling contractors with sufficient information to assist bore construction. • Working with irrigation specialists to provide information on domestic bores and their efficient use. • Working with industry to adopt best management practices for small dewatering projects where appropriate.

- Other
- Education through schools, public meetings or written reports.
 - Encouraging the sharing of domestic bores between neighbours.
 - Monitoring of groundwater systems to assess appropriate management responses.
 - Informing residents of any change in the management approach required as a result of monitoring results.
 - Developing agreements between the department and relevant Commonwealth government agencies on managing the water taken by these agencies.

An example of the community awareness approach is the *Perth groundwater atlas* developed by the department. The atlas provides the community with useful information including the depth to groundwater, areas where the groundwater has been contaminated, and general hydrogeological information. It is widely used by bore drilling contractors to determine the required depth of a bore in a specific location. The atlas is updated regularly and is available on the department's website.

Another example was the introduction of the garden bore rebate scheme that provided a financial incentive for people wishing to construct and use domestic bores in areas deemed suitable.

3.3.2 Regulations

Regulation can only be utilised to manage and restrict activities that can be licensed under the *Rights in Water and Irrigation Act 1914* and cannot be used to manage activities undertaken under Commonwealth legislation.

In October 2007, the Department of Water gazetted an Exemption Order that exempts certain groundwater uses from licensing under the Act. The taking of groundwater from the water table aquifer is not licensed where it is used for:

- firefighting purposes
- watering cattle or other stock, other than those being raised under intensive conditions
- domestic garden and lawn irrigation (not exceeding 0.2 ha).

This Exemption Order applies to all parts of the state except the Albany groundwater area and the Exmouth peninsular where groundwater resources are limited and more active management is required of all groundwater users. The Exemption Order also addresses watering efficiency issues.

Another Exemption Order (gazetted in 2005) exempts from licensing under the *Rights in Water and Irrigation Act 1914*, short-term (up to seven days) dewatering activities taking small volumes of groundwater from the water table aquifer. Such dewatering generally supports small projects such as the construction of sewage pumping stations.

The volume of groundwater taken by unlicensed users may be regulated by issuing directions under sections 26GC and 26GD of the *Rights in Water and Irrigation Act 1914*. This action may be taken when unacceptable and long term impacts to the health of the environment, to other groundwater users or the groundwater resource become evident. Regulations may be used when other management approaches such as public information and awareness campaigns have not been effective.

3.4 Water quality issues

It is the responsibility of the groundwater user to ensure that the groundwater taken is suitable for the proposed use and does not pose any health risks. The main groundwater quality issues are discussed below.

3.4.1 Acid sulfate soils

Acid sulfate soils are widespread around the coastal regions. They are also locally associated with freshwater wetlands and saline, sulfate-rich groundwater in some agricultural areas. Although benign in a waterlogged environment, when the soils are drained or excavated, the iron sulfides in the groundwater react with the oxygen in the atmosphere to produce sulfuric acid. The acid can then cause the release of metals and nutrients which can leach into the groundwater and eventually find their way into nearby wetlands or the river, causing environmental and economic harm.

The rising acidity of the groundwater can also impact on infrastructure such as piping and pumping stations, and can damage footings that may weaken structures. Acidic groundwater can also significantly harm plants if it is used to irrigate domestic lawns and gardens.

The *Perth groundwater atlas* contains a map showing the areas that are considered to be at high risk to increasing acidity. In these areas, lowering the groundwater table through prolonged pumping or dewatering may disturb the soils and increase the acidity of the groundwater. Additional information may also be obtained from the Department of Environment and Conservation website.

3.4.2 Contaminated sites

Several hundred sites have been identified as actual or potential contaminated sites. The groundwater beneath these sites may be contaminated by heavy metals, petroleum hydrocarbons, solvents and acidity from previous land practices. The concentration of contaminants in the groundwater beneath many contaminated sites is sufficiently high that if the groundwater is used for irrigation purposes it may cause harm to humans.

A contaminated sites database is publicly available from the Department of Environment and Conservation website. The department strongly advises that the contaminated sites database is referenced to determine if there are any restrictions on the property regarding the abstraction of actual or possibly contaminated groundwater.

3.4.3 Saline water interface

Groundwater near the ocean or the river may be brackish or even saline. There have been occasions where the salinity of the groundwater taken from domestic bores located next to the river, increased to levels that are unsuitable for irrigation.

The department has identified the areas at risk to saline water intrusion that are unsuitable for the construction and use of domestic bores. Most of these areas are next to the river, the ocean and wetlands found around the coastal area. These areas are available from the *Perth groundwater atlas*.

3.5 Increasing the management effort where required

The department continually monitors the groundwater resources and the level of stress on the environmental values (wetlands; surface water streams) that depend on these resources. Management approaches are reviewed regularly to take account of new information, climate change and community values.

Where monitoring results indicate that the management approaches have not been successful in reducing the stresses in the water table aquifer, the department will incrementally increase the effort of managing unlicensed groundwater use. This may involve:

- imposing more stringent restrictions than the current three day per week watering regime
- issuing directions under the *Rights in Water and Irrigation Act 1914* on the use of unlicensed groundwater
- requiring the construction of all new bores to be licensed, (even low yielding bores) to more actively manage and control their number and location
- requiring that all groundwater-taking activities be licensed and given a water entitlement
- metering of bores.

The management response will reflect:

- the degree of stress on the groundwater resource
- the impact on the environment and other water users
- community values.

Generally, unlicensed stock watering bores will be given equal consideration with domestic bores when increasing the management effort in a specific area.

Appropriate changes will be made to existing Exemption Orders or the drafting of other regulations or by-laws to permit any changes in management.

3.6 Setting aside water for unlicensed groundwater use

The department is committed to ensuring the state's water resources are used sustainably, that the environment is protected and future development opportunities are not compromised. To achieve this aim, all groundwater use must be accounted for.

The department will set aside a sufficient volume of water to account for unlicensed groundwater uses before licensed entitlements are granted. The volume of groundwater set aside will be identified through the allocation planning process (where the allocation limit of a water resource is determined). This is outlined in Figure 1 on the next page.

When setting this volume for a water resource, the department will make use of:

- surveys and local knowledge
- estimates of the number of properties in an area likely to have domestic bores from local government plans and land zoning
- information on the subdivision potential of the properties (current and future)
- information on the changes to the recharge potential of an area that may result from changes in land use (e.g. from bushland to urban).

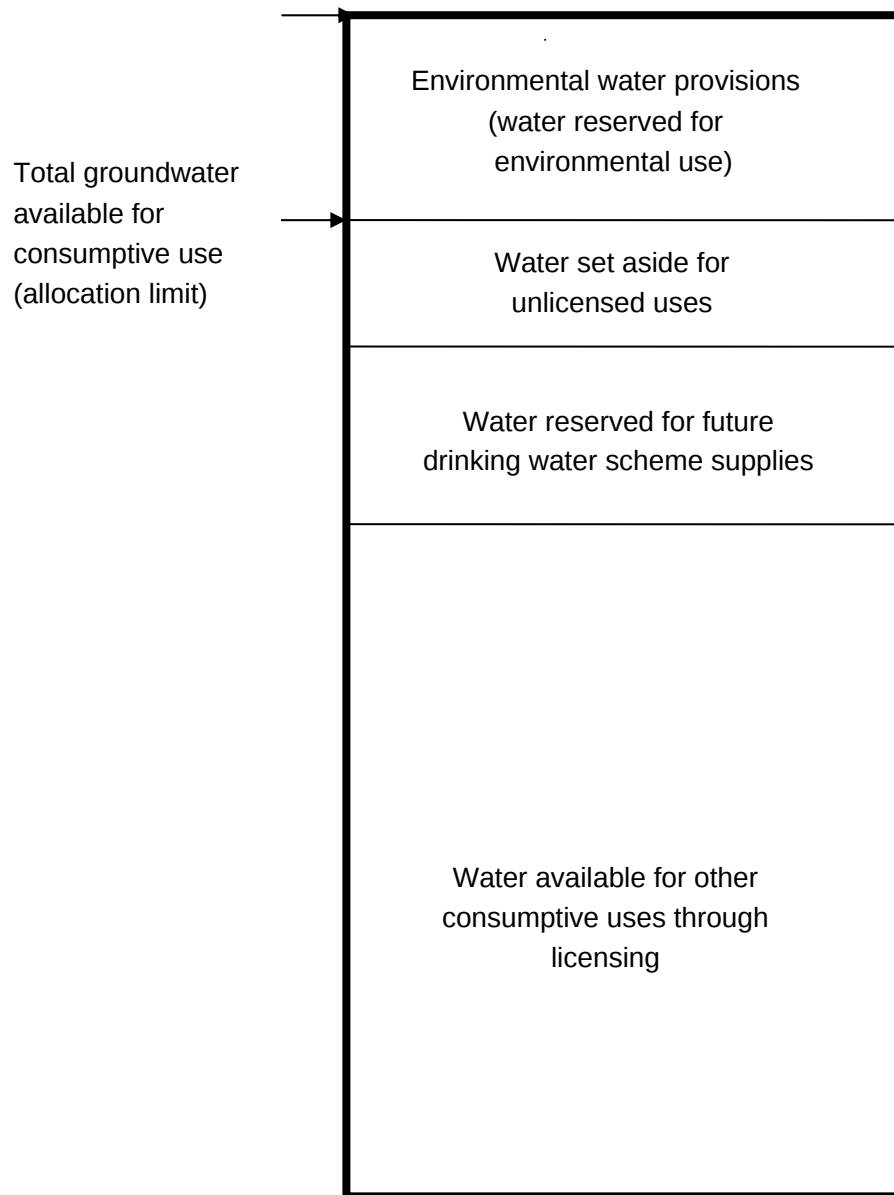
The department will also:

- distinguish between areas that are/can be serviced through a water supply scheme, and those that cannot
- consider the water use and future requirements of Commonwealth government agencies
- assess the practicality of accessing the local aquifers.

Although this approach does not account for all groundwater use as accurately as licensing, it is sufficiently accurate when considering the available information and the need to adopt cost-effective management practices.

The department also acknowledges that the volume of unlicensed groundwater use will vary over time and in some areas, possibly increase.

The largest increases in unlicensed groundwater use are likely to be from the installation and use of more domestic bores in newly established subdivisions. However, changing the land zoning from bushland to urban will also significantly increase the recharge to the water table aquifer. To account for these changes, the department will update the total groundwater availability in the water resource management area in which the new subdivision is located, and set aside an increased volume for unlicensed use. Therefore, in most cases, the groundwater available for licensed groundwater use will not change.

Figure 1 Allocating the groundwater resources

Subdividing bushland or rural properties into rural lifestyle lots does not noticeably increase groundwater recharge, because clearing of vegetation and introduction of hard surfaces is limited compared to the size of individual lots. In these cases, groundwater demand may increase as the newly created properties require the construction and use of domestic bores to create and maintain the rural lifestyle expectations. The department will discuss these issues with land developers in areas where it determines that the number of new domestic bores likely to be constructed may have an impact on groundwater availability for licensed groundwater users. In some specific cases, the department may request that the developer obtains water entitlements and submit them to the department to increase the volume of water set aside for unlicensed use.

The department will update the volume of water set aside for unlicensed groundwater use when it determines there is a significant change in the number of unlicensed bores or when developing a new water allocation plan or when updating an existing one.

Indicative water use values outlined in Table 1 are used by the department to estimate the volume of water taken from domestic bores. The average bore installation rate indicates the percentage of properties that may install a bore. The figures provided are generic for the Perth metropolitan region, and do not account for the considerable variation that occurs between areas. The department may vary these figures to suit local conditions where appropriate or when it obtains additional information.

The department uses benchmarks from the Department of Agriculture and Food, Western Australia, to determine the volume of water required for stock watering purposes.

Table 1 Indicative water use from domestic bores

Property size (m ²)	Indicative groundwater use (kL/yr)	Average bore installation rate (% of lots)
Less than 500	400	5
500–999	800	30
1000–5000 (0.5 ha)	1000	50
Greater than 5000 (0.5 ha)*	1500 ^{# +}	80

* These property sizes are associated with special rural or rural properties.

[#] Incorporates a component for internal household requirements (150 kL), and is sufficient to water approximately 2000m² of lawns and gardens.

+ A lower bench mark of 1200 kL/year will be specified for the south coastal region while 2000 kL/year is provided for the Pilbara and Kimberley regions to account for the difference in rainfall and evaporation rates.

3.7 Construction of unlicensed bores

Unlicensed groundwater users must ensure their bores are properly constructed if they are to last longer and be more efficient, thus minimising the cost of pumping. The department recommends that the *Minimum construction requirements for water bores in Australia 2003* be used when constructing and decommissioning bores and where possible a registered driller be used.

3.8 Water use efficiency

The department actively promotes water use efficiency through information and awareness programs, which continue to improve community understanding of water-related issues.

Domestic bore owners can improve the efficiency of their watering systems by selecting appropriate sprinkler types and sizes or installing soil moisture sensors that

detect when irrigation is required. Further savings may be made by not watering during the winter months or when it rains.

However, some domestic bore owners continue to use their bores wastefully, irrigating for long periods or too often. To reduce these inefficient practices and limit losses from evaporation, the use of sprinklers from domestic bores has been restricted between 9 am and 6 pm across the state by an Exemption Order under section 26C of the *Rights in Water and Irrigation Act 1914*, gazetted in October 2007. These restrictions do not apply to highly efficient methods of delivering water to plants, such as sub-surface trickle irrigation.

In addition, the same Exemption Order restricted the number of days per week when domestic bores may be used with sprinkler irrigation systems in the Perth region. Currently, the use of domestic bores in the Perth region is restricted to three days per week. The days of watering are related to the house or lot number. Exemptions to these restrictions may be sought from the department by homeowners who wish to establish new lawns or by senior citizens to amend the time of sprinkler use.

These restrictions are enforced by monitoring domestic bore use and responding to community complaints. Bore owners found not to be abiding by the restrictions may be given a warning and asked to comply or may be fined under the provisions of the Exemption Order.

In the future, depending on the climate and rainfall patterns these restrictions on garden bore use may be changed and possibly increased.

4 Review

This policy will be reviewed five years from the publication of this document. The policy may be reviewed sooner if significant changes (such as the introduction of new water management legislation or new water management initiatives) warrant a review of this policy.

Glossary

Allocation	is the volume of water taken from a water source (groundwater or surface water) for use by an individual, usually in accordance with a licence granted under the <i>Rights in Water and Irrigation Act 1914</i> .
Allocation limit	refers to the total volume of water that can be harvested for consumptive uses each year from a water resource with acceptable impacts.
Artesian bore	is a bore, including all associated works, from which water flows, or has flowed, naturally to the surface.
Aquifer	means a geological formation or group of formations capable of receiving, storing and transmitting significant quantities of water.
Bore	is used (in this policy) to describe an opening in the ground made or used to obtain access to underground water. This is equivalent to the description of a 'well' in the <i>Rights In Water and Irrigation Act 1914</i> .
Confined aquifer	is an aquifer saturated with water which is under pressure because the aquifer is situated between relatively impervious layers.
Domestic bore	refers to a bore used for providing the in-house and household garden watering requirements. In urban zoned areas these bores are also referred to as garden bores and are used to supplement the scheme water supply and abstract around 800 kL/year. In rural lifestyle properties these bores (also referred to as household bores) may provide the in-house watering needs and irrigate up to 0.2 ha of lawns and gardens.
Ecological water requirements	means the water regimes needed to maintain the water-dependent ecosystems at a low level of risk.
Environmental water provisions	means the water volume that is provided to maintain the environment, including the social and cultural requirements, as a result of the water allocation decision-making process. Environmental water provisions take into account the ecological, social, cultural and economic impacts. They may meet in part or in full the ecological water requirements.
Environment	means living things, their physical, biological and social

surroundings and interactions between all of these.

Full allocation	refers to an area where all the available water resources have already been allocated.
Groundwater	refers to the water that occurs in pore spaces and fractures in rocks beneath the ground surface.
Hydrogeology	means the geological science associated with the occurrence, distribution, movement and quality of groundwater
Policy	Refers to a protocol that is not directly supported by any legislation but has been adopted by the department as its guide to undertaking its business.
Stock bore	is a bore that provides drinking water for stock use.
Sustainable limit	the volume of water that can be taken from a water resource system (expressed as an extraction regime, including both for consumptive and non-consumptive uses) without causing unacceptable impacts.
Unconfined or water table aquifer	is an aquifer which generally receives direct recharge from rainfall. Its upper surface is the water table and the aquifer is not confined or is under pressure.
Water use efficiency	means the wise use of a water resource to reduce wastage to a minimum.

References

- Department of Environment and Conservation 2008, *Acid sulfate soil risk map*, Fact sheet, Perth.
- Department of Environment and Conservation 2009, *Contaminated sites database*, available from the Department of Environment and Conservation website at <www.dec.wa.gov.au/contaminatedsites>, Perth.
- Department of Health 2008, *Using bore water safely*, Department of Health, Perth.
- Department of Water 2008a, *Perth groundwater atlas*, Department of Water, Perth.
- Department of Water 2009, *Analysis and response to public submissions on Strategic policy 2.03 – Managing unlicensed groundwater use*, Department of Water, Perth.
- Department of the Premier and Cabinet 2007, *State water plan*, Government of Western Australia, Perth.
- Government of Western Australia, *Rights in Water and Irrigation Act 1914*, State Law Publisher, Perth.
- Land and Water Biodiversity Committee 2003, *Minimum construction requirements for water bores in Australia, Edition 2*, Land and Water Biodiversity Committee, Canberra, September.
- Metropolitan Water Authority 1985, *Domestic water use study*, unpublished, Metropolitan Water Authority, Perth.
- Water Authority of Western Australia 1987, *Perth urban water balance study*, unpublished, Water Authority of Western Australia, Perth.
- Water Authority of Western Australia 1990, *General principles and policy for groundwater licensing in Western Australia*, Water Authority of Western Australia, Perth.
- Water Authority of Western Australia 1995, *Patterson survey of the distribution of domestic bores in the Perth region*, unpublished, Patterson, Perth.
- Water and Rivers Commission 1997, *Water advice no. 2 – Information for Perth gardeners*, Water advice series no. 2, Water and Rivers Commission, Perth.
- Water and Rivers Commission 2000, *Statewide policy no. 3 – Policy statement on sharing water*, Statewide policy series no. 3, Water and Rivers Commission, Perth, May.
- Water and Rivers Commission 2001, *Perth's private groundwater demand to 2020*, unpublished, Aquaterra, Perth.
- Water and Rivers Commission 2003, *Statewide policy no. 6 – Transferable (tradeable) water entitlements for Western Australia*, Statewide policy series no. 6, Water and Rivers Commission, Perth.

Regional enquiries

Please direct any enquiries relating to the implementation of this policy or to management of water resources in the regions to the following regional offices:

Kimberley Region
27 Victoria Highway
Kununurra WA 6743
Telephone (08) 9166 4100
Facsimile (08) 9168 3174

Swan Avon Region
7 Ellam Street
Victoria Park WA 6100
Telephone (08) 6250 8000
Facsimile (08) 6250 8050

Pilbara Region
Lot 4608 Cherratta Road
Karratha WA 6714
Telephone (08) 9144 2000
Facsimile (08) 9144 2610

Mandurah Region
107 Breakwater Parade
Mandurah WA 6210
Telephone (08) 9550 4222
Facsimile (08) 9581 4560

South Coast Region
5 Bevan Street
Albany WA 6330
Telephone (08) 9842 5760
Facsimile (08) 9842 1204

Mid West–Gascoyne Region
94 Sanford Street
Geraldton WA 6530
Telephone (08) 9965 7400

South West Region
35–39 McCombe Rd
Halifax WA 6231
Telephone (08) 9726 4111
Facsimile (08) 9726 4100