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

# Lower Gascoyne groundwater and surface water allocation plan

Draft for public comment

*Looking after all our water needs*

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Department of Water

Water resource allocation planning series

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# Foreword

The Gascoyne River ground and surface water resources are vital to the Carnarvon community, in particular to the Carnarvon irrigated horticulture industry. Providing certainty in water allocations is a high priority of the Government of Western Australia, with the Gascoyne Foodbowl Initiative receiving funding to increase the agricultural potential of the region.

*The Lower Gascoyne groundwater and surface water allocation plan* will provide the Department of Water's direction for the allocation and licensing of the ground and surface water resources in the plan area. The plan will state the volume of water that is available for use and the rules that are in place to manage the risks to supply.

Your input to this draft for public comment is important as it will help us improve the final plan. Once you have read this document, we encourage you to send us your comments by 31 March 2011.

We will review and consider all comments we receive on this draft water allocation plan. We will produce a statement of response which will summarise how we used your comments in finalising the plan. This response will be released with the final plan.

Maree De Lacey

Acting Director General, Department of Water

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# Summary

The Department of Water is responsible for allocating and licensing abstraction of Western Australia's water resources. The department uses water allocation plans to manage how water is abstracted from surface and groundwater systems.

In making allocation decisions, the department considers the needs of licensed water users and the community as a whole. The Carnarvon irrigated horticultural area is highly valued, and the community expects a high level of certainty that abstraction will not have an adverse effect on the quality, quantity and reliability of the resource for existing and future water users.

The *Lower Gascoyne groundwater and surface water allocation plan* was developed to:

- review the volume of water available for sustainable abstraction based on the best available information
- support development in the area by clearly specifying the volume of water available for abstraction and the options for managing the resource
- present licensing rules for managing the impact of water abstraction on water quality, quantity, reliability and the ecological and social values in the plan area.

## Water availability and licensing rules

The plan sets out the department's approach to water allocation in the plan area. We have sought to balance the volume of water made available for consumptive use with the need to protect the quality of the resource and in situ values. A 'yield range' was determined and the allocation limits were set within this range, based on the acceptable level of risk to the reliability of supply. The allocation limits for each of the resources are summarised in Table 1. We use the term 'resources' to describe the management units for which we set allocation limits.

*Table 1 Summary of Lower Gascoyne allocation limits*

| Resource | Allocation limit (GL/yr) |
|---|---|
| **Groundwater resources** | |
| Lower Gascoyne alluvial subarea A | 6.1 |
| Lower Gascoyne alluvial subarea B–L | 14.0 |
| Yandoo surficial | 0.1 |
| **Total** | **20.2** |
| **Surface water resources** | |
| Carnarvon irrigation district | Not set |

This allocation plan explains how the department allocates groundwater and surface water through the licensing process. This includes how we manage the impacts of abstraction through licensing rules. All licensing decisions will be made in accordance with this plan.

## Finalising the plan using the public submissions

We have released the draft *Lower Gascoyne groundwater and surface water allocation plan* for public comment and will review and consider your comments before finalising the plan. We will produce a statement of response that summarises the comments and our responses to them and this will be released with the final plan. We may quote directly from your comments, so please state clearly if you do not wish us to do so.

Please send your comments to allocation.planning@water.wa.gov.au or the address below by 5.00 pm 31 March 2011.

Kerrie Gorman

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# 1 Introduction

The Department of Water has developed the *Lower Gascoyne groundwater and surface water allocation plan* to review the allocation limits and local licensing rules.

This plan updates and replaces *Managing the groundwater resources of the Lower Gascoyne River (Carnarvon) WA* (WRC 2004). This plan is accompanied by the *Lower Gascoyne allocation methods report* (DoW 2010a) which provides further technical detail on the Lower Gascoyne allocation decisions.

We have considered the variation in water resource issues and in situ values in different parts of the Lower Gascoyne plan area when deciding the allocation limits and developing the licensing rules. Subarea A has relatively high water use, is privately abstracted and is over-allocated, whereas subarea B–L has relatively low water use, is distributed through an irrigation supply network and water is available.

## 1.1 Why are we reviewing this plan?

To support development in this area the department has sought to confirm the volume of fresh water available to be sustainably abstracted from the system. The Gascoyne Foodbowl Initiative, a high priority project of the Government of Western Australia, seeks to increase the agricultural potential of the region. Further licensed entitlements are expected to be sought to support the expansion of the horticultural industry.

Since the 2004 plan we have collected new information and undertaken modelling to allow us to determine the sustainable yield range with improved accuracy. Our aim is to set the allocation limit as high as possible within the range of a sustainable yield while achieving an acceptable reliability of supply for all users and protecting in situ values. To manage any risk to the resource we needed to update the licensing rules so any changes detected by monitoring can trigger us to change how we are managing the system.

In the earlier plan, *Managing the groundwater resources of the Lower Gascoyne River (Carnarvon) WA* (WRC 2004), we made a commitment to review water allocation in the area by 2010.

## 1.2 Scope of the plan

The plan establishes groundwater allocation limits and ground and surface water licensing rules for the proclaimed areas within the Lower Gascoyne groundwater and surface water allocation plan area, consistent with the licensing powers of the *Rights in Water and Irrigation Act 1914*.

The plan describes:

- the allocation planning boundaries – groundwater subarea and resource boundaries
- the amount of ground and surface water available for licensed water use

- our approach to managing ground and surface water including:
  - the objectives for the water resource and for water management licensing rules for allocating water licence entitlements
  - how we will implement, evaluate and review the plan.

The plan does not:

- address water source protection, flooding, drainage or land planning issues
- discuss the allocation and licensing approach associated with the confined artesian aquifers in the plan area, as this is addressed in the *Carnarvon artesian basin water management plan* (DoW 2007).

The government of Western Australia is currently reviewing and updating its legislation for the state's water resources. The approach and structure of this plan is consistent with the requirements of the *Rights in Water and Irrigation Act 1914* and, as far as possible, with the intent and purpose of the changes to legislation and with the National Water Initiative. Once new legislation is enacted a future update of this plan will incorporate the appropriate changes and may introduce more contemporary mechanisms for allocating water.

## 1.3 The plan area

### 1.3.1 Location

This plan applies to the area defined as the Lower Gascoyne groundwater and surface water allocation plan area (Figure 1). The plan area is located approximately 900 km north of Perth.

The plan area is the same as the boundary of our groundwater model (GASFAMS V1) and covers approximately 1187 $km^2$ (CyMod 2010). This boundary was selected as the model is the primary tool for informing management decisions in this plan.

All ground and surface water resources subject to this plan are proclaimed under the *Rights in Water and Irrigation Act 1914* (Table 2) as a ground or surface water area. This means that water users require a water licence to lawfully abstract groundwater and surface water under Section 5C of the *Rights in Water and Irrigation Act 1914* in this area.

*Table 2 Proclaimed areas*

| Proclaimed groundwater areas | Proclaimed surface water areas |
|---|---|
| • Gascoyne groundwater area Carnarvon groundwater irrigation district | • Gascoyne River and tributaries Carnarvon surface water irrigation district |

The plan area also contains the proclaimed Carnarvon water reserve to protect the water quality of the Carnarvon Town water supply. Refer to the *Carnarvon water reserve drinking water source protection plan* (DoW 2010b) for further detail.

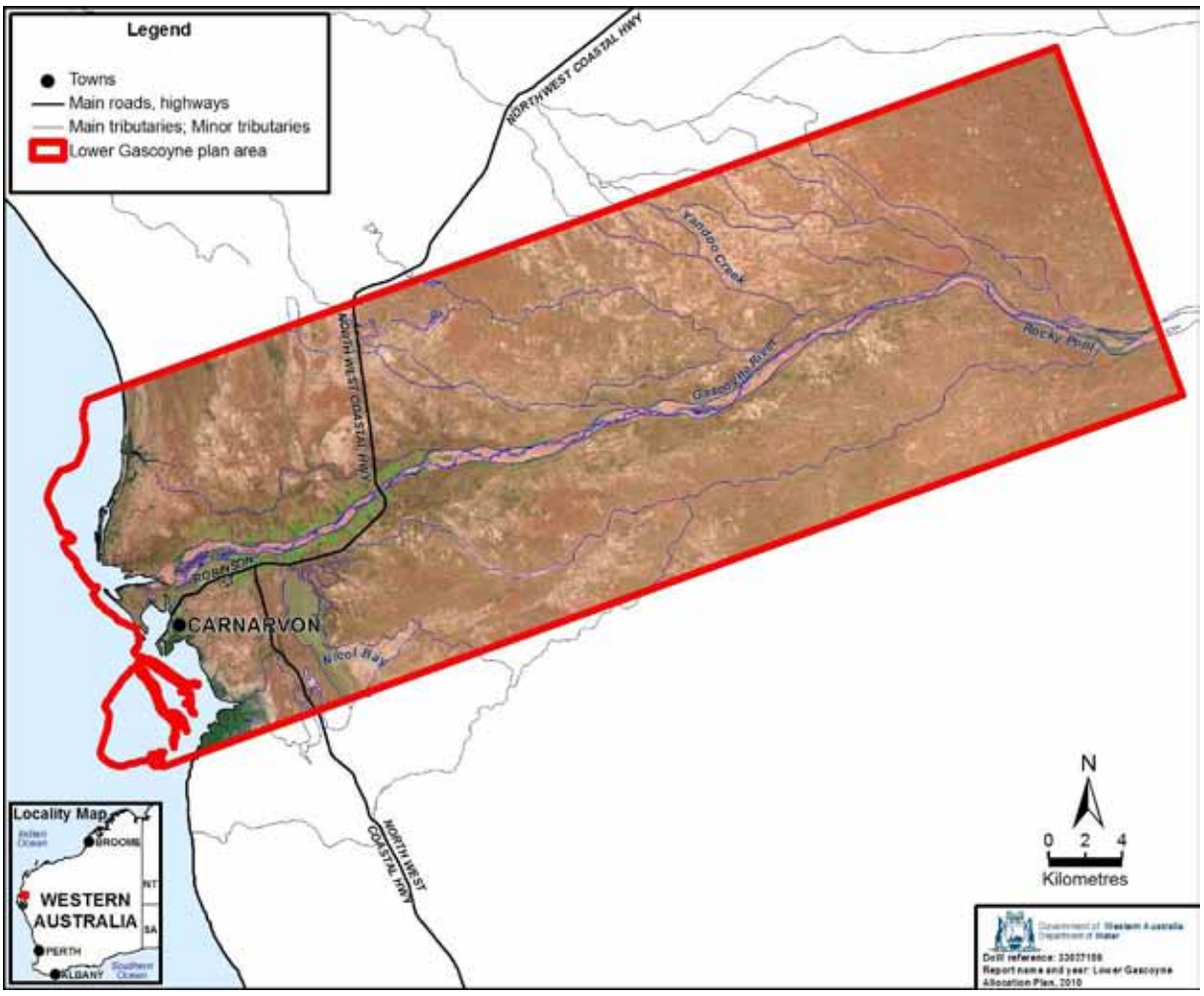


*Figure 1 Lower Gascoyne groundwater and surface water allocation plan area*

## 1.4 Water resources covered by this plan

The plan covers the unconfined and semi-confined surficial and alluvial aquifers present within the plan area. The aquifer boundaries that the department has used to define the resources for this plan are shown in Figure 2.

The Lower Gascoyne alluvial aquifer consists of two hydraulically connected formations – the river bed sands formation and the older alluvium formation (Figure 3). These formations are distinct but in direct hydraulic connection. When setting allocation limits we manage them as a single resource.

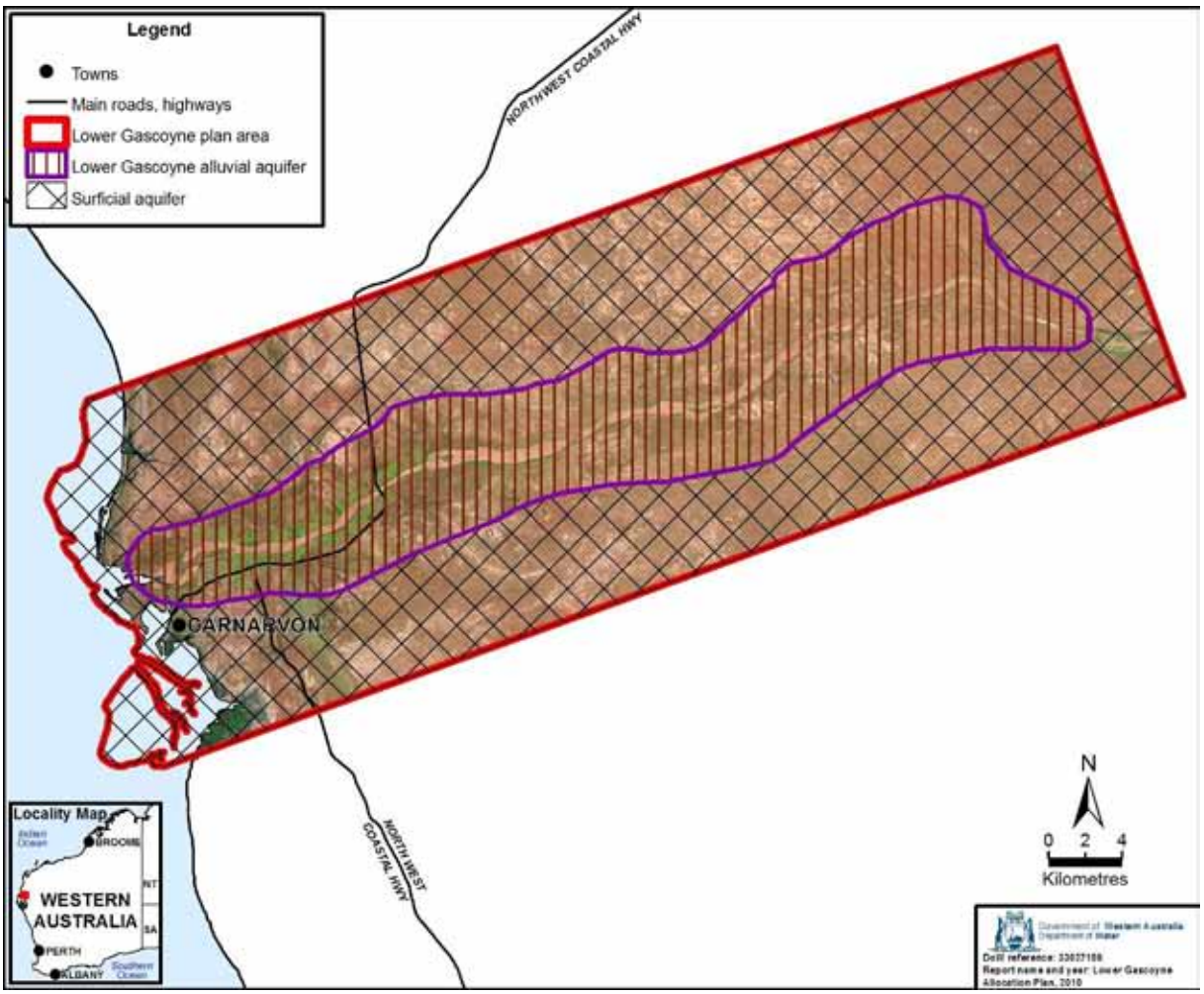


*Figure 2 Aquifer boundaries in the plan area*

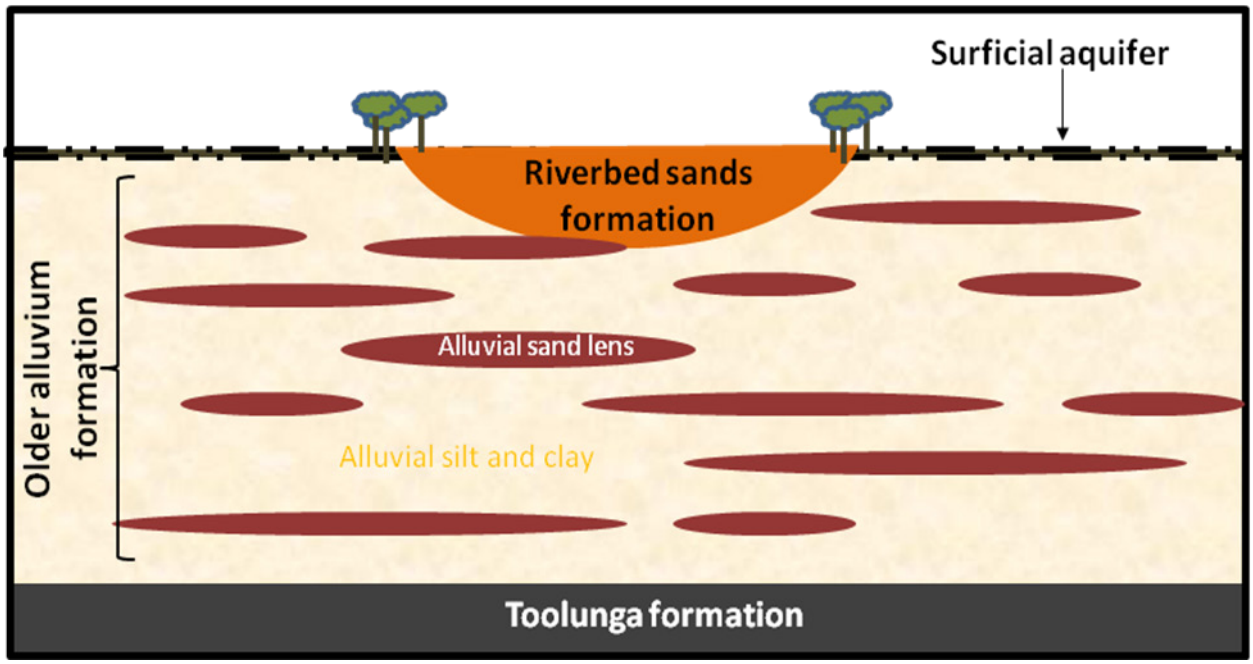


*Figure 3 Aquifer cross-section*

The plan area is part of the Gascoyne groundwater area and is referred to as the Lower Gascoyne plan area for allocation planning and licensing purposes. Within the plan area three subareas have been defined (Figure 4).

- Yandoo surficial
- Lower Gascoyne alluvial subarea A
- Lower Gascoyne alluvial subarea B–L.

The department has set an allocation limit for each resource (see Section 3).

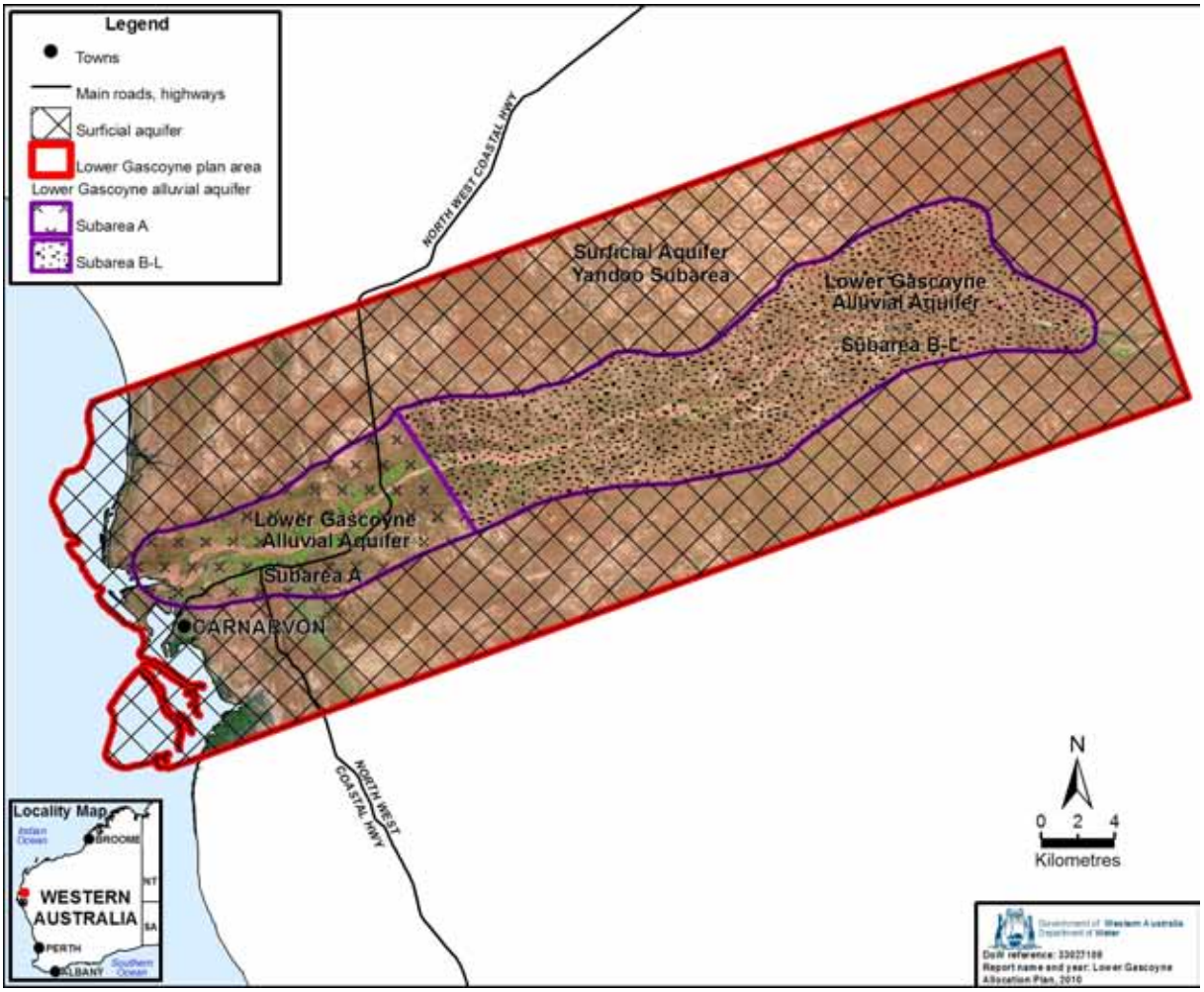


*Figure 4 Resource boundaries*

## 1.5 When and for how long will this plan apply?

The *Lower Gascoyne groundwater and surface water allocation plan* will come into effect from the 1 January 2011. This is when *Managing the groundwater resources of the Lower Gascoyne River (Carnarvon) WA* (WRC 2004) formally ceases.

We will evaluate the performance of the plan each year. This process will tell us when the plan should to be reviewed.

# 2 What we want this plan to achieve

The department aims to provide the maximum volume of water for abstraction while minimising the risk to groundwater quality, to individual licensee source reliability and to in situ values.

We set water resource and water management objectives in water allocation plans to achieve the desired end result or outcome of water resource management in the plan area.

Water resource objectives relate to maintaining, increasing, improving, restoring, reducing or decreasing surface water flow, groundwater levels or water quality.

Water management objectives relate to how we manage water allocation and what we want our management to achieve. They will usually relate to the implementation of an allocation limit, how water is taken and the rules for taking water to avoid ecological and social harm or adverse effects on other water users.

There are different water resource issues in different parts of the Lower Gascoyne plan area. Subarea A has relatively high water use, is privately abstracted and is over-allocated, whereas subarea B–L has relatively low water use, is distributed through an irrigation supply network and water is available.

## 2.1 Objectives

**Water resource objectives for subarea A and subarea B–L**

The water resource objectives of this plan are:

R1 To ensure that increased salinity does not cause significant or permanent degradation to the resource.

R2 To maintain groundwater levels and water quality sufficient to meet the minimum in situ value water requirements.

***Water management objectives***

The water management objectives of this plan are:

*Subarea A*

M1 To maximise the volume of fresh (less than 1000 mg/L TDS) groundwater available for abstraction in the older alluvium during periods of low aquifer recharge.

M2 To maximise the abstraction of surface water flows.

M3 To ensure licensees comply with all licence conditions.

M4 To recover licensed entitlements to within the allocation limit.

M5 To promote water use efficiency.

*Subarea B-L*

M6 To maximise the volume of fresh (less than 1000 mg/L TDS) groundwater available for abstraction in the older alluvium during periods of low aquifer recharge.

M7 To maximise the abstraction of surface water flows.

M8 To manage abstraction in the area to ensure there is a low risk to the public water supply for Carnarvon.

This plan continues the refinement of water management in this area. It is a step towards the long-term aim of improving our knowledge and refining the way infrastructure is constructed and operated to ensure the maximum sustainable volume of water is abstracted.

## 2.2 How will the plan achieve its objectives?

To meet the objectives of this plan we will:

- apply the department's approach for allocating and licensing water (Section 4)
- licence the abstraction of water according to the licensing rules (Section 4)
- carry out the actions described in Section 6.1.

# 3 Allocation limits

Allocation limits are the annual volume of water set aside for consumptive use from a water resource.

The allocation limit consists of three types of components:

- licensable components (including general licensing and licensed public water supply)
- reserves (including future public water supply reserves)
- unlicensable components (including water for exempt unlicensed use).

The department was not aware of any unlicensed water use within the plan area when this plan was being prepared.

The water set aside for general licensing in the Lower Gascoyne is the allocation limit minus the water set aside for exempt unlicensed use, public water supply and public water supply reserves.

The allocation limits are presented in Table 3 for the three groundwater resources in the Lower Gascoyne Plan area. For details of the method and information we used to set allocation limits see *Lower Gascoyne methods report* (DoW 2010a). We did not set a surface water allocation limit for the Carnarvon irrigation district as flows are highly variable from year to year.

It is important to note that although an allocation limit has been assigned to a groundwater resource this does not automatically mean that that volume of water can be abstracted from a single point. For example, if there is a total of 5.0 GL/yr of water available from an aquifer, abstraction of this volume may only be possible if distributed over a number of bores.

The department may amend allocation limits if new hydrogeological information allows yield estimates to be refined or if monitoring indicates we are not meeting the plan's water resource objectives (Section 6.1, Action 5). We will publish any amendments to the allocation limits in the annual evaluation statement.

Please contact our Mid West Gascoyne office for up-to-date information on water availability.

*Table 3 Groundwater allocation limits and water available for licensing*

| Groundwater resources | | | | | |
|---|---|---|---|---|---|
| **Resource** | **Allocation limit GL/yr** | **Allocation limit components GL/yr** | | | |
| | | **Licensable** | | **Unlicensable** | **Reserved water** |
| | | **General licensing** | **Public water supply** | **Unlicensed use** | **Public water supply** |
| Lower Gascoyne alluvial subarea A | 6.1 | 6.1 | 0.0 | 0.0 | 0.0 |
| Lower Gascoyne alluvial subarea B–L | 14.0 | 10.4 | 1.8 | 0.0 | 1.8 |
| Yandoo surficial | 0.1 | 0.1 | 0.0 | 0.0 | 0.0 |
| **Total** | **20.2** | **16.6** | **1.8** | **0.0** | **1.8** |
| **Surface water resources** | | | | | |
| Carnarvon irrigation district | Not set | – | – | – | – |

# 4 Allocation and licensing policies

This allocation plan contains policies to address water allocation and licensing issues in the plan area. It provides guidance for assessing licence applications and setting the conditions attached to licences.

## 4.1 Legislative requirements

Water licences are the regulatory instrument the department uses under the *Rights in Water and Irrigation Act 1914* to manage individual water abstraction and use. The department uses the licensing process to manage the available water, up to the allocation limits set in Section 3.

A water licence provides legal and secure access to water. The department uses water licences to manage water abstraction and use at an individual scale to:

- support economic growth
- protect other users
- protect water-dependent ecosystems.

Water users in the Lower Gascoyne plan area require a water licence to lawfully take groundwater and surface water under Section 5C of the *Rights in Water and Irrigation Act 1914*. The granting of a water licence is at the department's discretion. As well as the allocation plan, we always consider the sections of Clause 7 (2) of Schedule 1 of the *Rights in Water and Irrigation Act 1914* in exercising this discretion.

The department undertakes the licensing process in accordance with the requirements of:

- the *Rights in Water and Irrigation Act 1914*
- the strategic and operational policies that apply state-wide
- local licensing rules outlined in this plan.

Clause 15 of Schedule 1 of the *Rights in Water and Irrigation Act 1914* enables the department to include terms, conditions and restrictions to licences. Conditions may refer to attachments or other documents that the licensee must abide by.

Clause 24 (1) of Schedule 1 in the *Rights in Water and Irrigation Act 1914* specifies the department's requirements for altering any licence condition and Clause 26 covers the rights of licensees. Any decision made on a licence application can be appealed through the State Administrative Tribunal.

### Exemptions

Private domestic water supply from the watertable (unconfined) aquifer is managed through the Rights in Water and Irrigation Act Exemption and Repeal (Section 26C) Order 2007, and *Strategic policy no. 2.03 – Managing unlicensed groundwater use* (DoW 2009b). Taking of groundwater from the watertable aquifer in the plan area is exempt from licensing where it is used solely for:

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

## 4.2 Approach to managing water through licences

### Water to support the release of new land

Under this plan additional water is only available for allocation in subarea B–L. The department will take into account the recommendations from the Gascoyne Foodbowl Local Consultative Committee when releasing additional water. Water for release is to be distributed through a water service provider and used within the plan area for irrigated horticultural purposes.

Licensed entitlements in subarea A are granted for a specific area of land. Should an application be made for new lots and/or land area to be added to a subarea A licence, we will review the licensed entitlement volume.

### Trading and transfers

Trades in subarea A are not likely to be practical due to the nature of the resource and community expectations. The department would support the movement of water where water is drawn from the transferor's prolongations and piped to the point of use.

### Alternative water supplies

Applicants should consider the use of alternative supplies such as recycled waste water, drainage and stormwater reuse or managed aquifer recharge where appropriate to meet their water requirements.

### Recovering over-allocated systems

Every three years the department will review licensed entitlement volumes in accordance with the *Statewide policy no. 11 – Management of unused licensed water entitlements* (WRC 2003). All water abstraction (including water abstracted during unrestricted pumping periods) will be considered in the review of entitlements. Areas at high risk of declining water quality will be a priority for review. The priority for review will be guided by those bores or prolongations monitored by the department where salinity levels exceed 850 mg/L TDS within six months following a river flow.

As the total entitlements exceed the allocation limit of subarea A (i.e. it is over-allocated), the department will not reallocate recouped water. Growers wishing to increase their water entitlements are encouraged to explore opportunities for piping water from other licensee's bores or purchase or trade scheme water entitlements.

The department will not recoup water entitlements that were acquired through trading (where a licensee has purchased or is leasing a water entitlement).

### Surface water

Only free flowing or standing water is to be drawn under a surface water licence. Any water that percolates into the ground and is drawn from a bore or other works is subject to groundwater licensing.

## 4.3 Licensing policies that apply state-wide

The department's state-wide strategic and operational policies apply to the plan area. Table 4 outlines the main strategic and operational policies that apply to the plan area for this allocation plan. They are listed by published date.

An updated list can be found on our website: <www.water.wa.gov.au> Doing business with us > Water licensing>.

If a new state-wide policy is released or an amendment to a state-wide policy is made, we will review the new state-wide policy to ensure it is relevant and appropriate to the Lower Gascoyne region. If it is not appropriate, we will develop new local licensing rules to meet the intent of the previous state-wide policy and update the plan.

*Table 4 Main strategic and operational policies that apply to the plan area*

| Policy | Points to note |
|---|---|
| *Statewide policy no. 11 – Management of unused licensed water entitlements (WRC 2003)* | To recover unused entitlements, the department may recoup portions of licensed entitlements that are consistently unused. Of particular note is:<br>• Section 4.11 (Wasting of water) |
| *Strategic policy no. 5.03 – Metering the taking of water* (DoW 2009c)<br>*Guidelines for water meter installation* (DoW 2009a)<br>*Rights in Water and Irrigation (Approved Meters) Order 2009* | Outlines the department's position on metering the taking of water in Western Australia. Of particular note is:<br>• Section 3.14 (Offence to damage or interfere with a water meter) |

| Policy | Points to note |
|---|---|
| *Operational policy no. 5.12 – Hydrogeological reporting associated with a groundwater well licence* (DoW 2009d) | Describes:<br>• hydrogeological information the department may request from the licence applicant to complete the assessment of the licence application<br>• when and where monitoring bores may be required<br>• the structure of monitoring reports that the licensee may be required to regularly submit to the department<br>• groundwater-dependent ecosystem assessments. |
| *Operational policy no. 5.11 – Timely submission of required further information* (DoW 2009e) | Describes how the department manages the timelines that a licensee has for submitting any additional requested information as part of their licence application. |
| *Strategic policy no. 1.01 – Managed aquifer recharge in Western Australia: allocation and water quality management* (DoW 2009f) | Describes how the department would deal with managed aquifer recharge if it was considered as an option in the plan area. |
| *Operational policy no. 1.2 – Policy on water conservation and efficiency plans: achieving water use efficiency gains through water licensing* (DoW 2009g) | Under this policy the department may require water use efficiency plans to be implemented by licensees. The department may require applicants to identify opportunities for using 'fit-for-purpose' lower quality water (such as high nutrient, dewater, drainage and stormwater reuse and recycled water) in a water conservation and efficiency plan. |
| *Operational policy no. 5.08 – Use of operating strategies in the water licensing process* (DoW 2010c) | Describes:<br>• which water licence applicants are likely to require operating strategies<br>• how operating strategies form part of the conditions of a water licence<br>• how licence applicants should develop an operating strategy<br>• the licensee's responsibilities in complying with an operating strategy. |
| *Operational policy no. 5.13 – Water entitlement transactions for Western Australia*, (DoW 2010d) | This policy contains the department's rules for a trade, transfer or lease of all, or part of, a licence's water entitlement. Of particular note:<br>• new landowners must apply to transfer water entitlements within 30 days of land sale.<br>• Only used water entitlements may be traded or transferred. |

## 4.4 Local licensing rules

The horticultural industry and the department already have rules in place to manage water use in the plan area. These were initially recorded in the minutes of the

Carnarvon Irrigation District Allocation Committee (in the 1980s) and were first documented in 1998 in *Rules of the River* (CWAAC 1998). The department refined and formalised the local rules for managing the area in *Managing the groundwater resources of the Lower Gascoyne River (Carnarvon) WA – groundwater management strategy* (WRC 2004). Community feedback and improved knowledge of the system has allowed us to build on the management strategies in *Managing the groundwater resources of the Lower Gascoyne River (Carnarvon) WA* (WRC 2004). These local licensing rules are set out in Table 5. Local rules complement the department's state-wide strategic and operational policies. The local licensing rules take precedence over state-wide policies if there is an inconsistency between them.

*Table 5 Local licensing rules in the plan area*

| Group | | Local licensing rules | |
|---|---|---|---|
| 1.1 | Water accounting year | 1.1.1 | The water accounting year begins on 1 January and ends on 31 December of the same year. |
| 1.2 | Metering | 1.2.1 | All ground or surface water abstracted must pass through a department approved flow meter (including water abstracted during unrestricted flow periods). |
| | | 1.2.2 | Water abstracted under a surface water licence must be metered separately from water abstracted under a groundwater licence. |
| | | 1.2.3 | The licensee must ensure that all water pumped is of a meterable quality (ie. free of mud, sand and large particles) to prevent damage to the meters. |
| | | 1.2.4 | It is the responsibility of a licensee to advise the department if the meter is not working. |
| 1.3 | Maximum monthly draw limit | 1.3.1 | Groundwater abstraction in subarea A is restricted to 10 000 kL/calendar month from any one property or prolongation unless otherwise notified by the department. |
| | | 1.3.2 | Surface water abstraction is restricted to a maximum of 20 000 kL/month. |
| 1.4 | Unrestricted groundwater pumping periods | 1.4.1 | At its discretion, the department may declare unrestricted groundwater pumping from the Riverbed Sands Formation in subarea A and subarea B–L.<br>Unrestricted groundwater pumping will start on the department's declaration which will be guided by when continuous flow is measured at the department's Nine Mile Bridge gauging station (704139). |

| Group | | Local licensing rules | |
|---|---|---|---|
| | | 1.4.2 | Unrestricted groundwater pumping will cease at the end of a calendar month on the departments declaration.<br><br>This decision will be at the department's discretion and will be guided by when the river ceases to flow at the department's Nine Mile Bridge gauging station (704139) or when the salinity of the river flow exceeds 500 mg/L TDS. |
| | | 1.4.3 | Licensees must demonstrate to the satisfaction of the department that their bore or spearpoint is in the Riverbed Sands Formation to be eligible to undertake unrestricted pumping. |
| | | 1.4.4 | Water abstracted from the Riverbed Sands Formation during a declared unrestricted pumping period does not count towards the licensee's annual entitlement but must continue to be metered. |
| | | 1.4.5 | Maximum monthly abstraction limits do not apply during periods of unrestricted pumping for abstraction from the Riverbed Sands Formation. |
| | | 1.4.6 | The department does not permit unrestricted pumping from the Older Alluvium Formation. Water abstracted from the older alluvium will count towards the licensee's annual entitlement. |
| 1.5 | 26D licence conditions on bore construction | 1.5.1 | All new bores must be more than 30 m from any existing bores on neighbouring properties or prolongation to manage the spatial distribution of the draw from an aquifer, unless the applicant can demonstrate there will be no impact if a bore is located closer than 30 m. |
| 1.6 | Managing water quality | 1.6.1 | All bores must have an individual water sampling point. |
| | | 1.6.2 | Where water abstracted is for use on land zoned for horticultural purposes (in accordance with the town planning scheme) the licensee must cease pumping when a salinity level of 1000 mg/L TDS is reached. |
| | | 1.6.3 | When Department of Water monitoring detects salinity levels exceeding 850 mg/L TDS in individual subarea A bores, the department will notify licensees of recorded high salinity levels. |
| | | 1.6.4 | Where water abstracted is for use on land zoned for non-horticultural purposes the licensee must cease pumping when a salinity level of 2500 mg/L TDS is reached. |
| 1.7 | Water contamination | 1.7.1 | All subarea A and subarea B–L licensees drawing from private bores are required to install a back-flow prevention device to flow meters. |
| | | 1.7.2 | All subarea A licensees who also draw from the scheme supply are required to install a back-flow prevention device between the two systems. |

| Group | | Local licensing rules | |
|---|---|---|---|
| 1.8 | Groundwater-dependent ecosystems | 1.8.1 | Proponents must demonstrate to the department's satisfaction that there is no impact on Rocky Pool as a result of groundwater abstraction. |
| | | 1.8.2 | No surface water abstraction is permitted from Rocky Pool or Chinaman's Pool reserve. |
| | | 1.8.3 | The department will not issue any new groundwater licences in Chinaman's Pool reserve. |
| | | 1.8.4 | Proponents in subarea B–L must demonstrate to the department's satisfaction that there is no impact on riparian vegetation as a result of groundwater abstraction. In the absence of demonstrating this, the licensee should ensure that the depth to watertable does not exceed lowest recorded water levels.<br>Should groundwater levels fall to within 10% of historical minimum water levels, licensees must:<br>• start to monitor tree stress using a standardised, department approved<br>• modify abstraction regime based on the results of tree stress monitoring and directions from the department. |
| 1.9 | Using the public water supply reserve for other purposes | 1.9.1 | Water from the public water supply reserve cannot be temporarily or permanently licensed for other purposes. |
| | | 1.9.2 | Public water supply is a priority over other uses. |
| 1.10 | Temporary increase to allocation limit in subarea B–L | 1.10.1 | The Department of Water will only approve an temporary increase to the allocation limit in subarea B-L if aquifer storage levels are sufficient and there is no risk to the Carnarvon town water supply. |
| | | 1.10.2 | The temporary increase to the allocation limit will be for a period of 12 months. |
| | | 1.10.3 | Another temporary 12-month increase of the same or lesser amount may be permitted following this period subject to a reassessment of the subarea B–L aquifer storage levels. Following the 12-month or 24-month period, the allocation limit will be reduced to the limit in this plan. |
| | | 1.10.4 | Further temporary increases to the allocation limit in subarea B-L will only be issued beyond the initial 24-month period if an assessment of aquifer storage levels and modelling show that no adverse effects will occur. |
| | | 1.10.5 | Any temporary licences issued may contain conditions requiring a monitoring program including assessment of groundwater-dependent ecosystems stress. |

## Additional information for groundwater users

*Bore water for domestic use*

The department does not recommend drinking bore water. If groundwater is used for private drinking water supplies, it is advisable to filter, treat and test the water according to advice from the Department of Health. The Department of Water's water quality information sheet *Safe use of bore water in rural areas* (DoW 2010e) also has some relevant information.

*Carnarvon water reserve drinking water source protection plan*

To protect the water quality and continue to provide reliable, safe drinking water to consumers in Carnarvon, the proclaimed Carnarvon water reserve is classified as a Priority 1 (P1) area. Under legislation, some activities are restricted in this area to protect the water source from contamination. If you would like more information go to <http://drinkingwater.water.wa.gov.au>.

# 5 Monitoring program

## 5.1 Program description

The department uses a network of monitoring bores and river gauging stations in the plan area to assess the status of the Lower Gascoyne alluvial aquifer and river and to check that abstraction is sustainable.

We use the information collected through the groundwater monitoring network to assess the groundwater resources, including water level and quality trends (Table 7).

This assessment helps us to:

- review licence conditions
- review impacts of abstraction on the groundwater resource
- evaluate the plan by measuring how well its objectives are being met (Section 6.2).

A comprehensive monitoring program is important in the plan area given the high level of abstraction and the need to adaptively manage changes in the system.

## 5.2 Current program

A program of surface and groundwater monitoring is currently undertaken within the plan area. No ecological monitoring is currently undertaken by the department.

### Surface water

Sixty-three streamflow gauging stations have operated periodically on rivers in the plan area. Table 6 gives details of the two streamflow gauges that provide the most consistent and long-term data. The location of these stations is shown in Figure 5. Nine Mile Bridge is the main gauging station we use to assess the duration and magnitude of river flows for the purposes of this plan.

*Table 6 Streamflow gauges used in plan development*

| | River gauge ID | Data recorded | Data range |
|---|---|---|---|
| Fishy Pool | 704193 | Stage height | 1964 – present |
| Nine Mile Bridge | 704139 | Stage height | 1957– present |

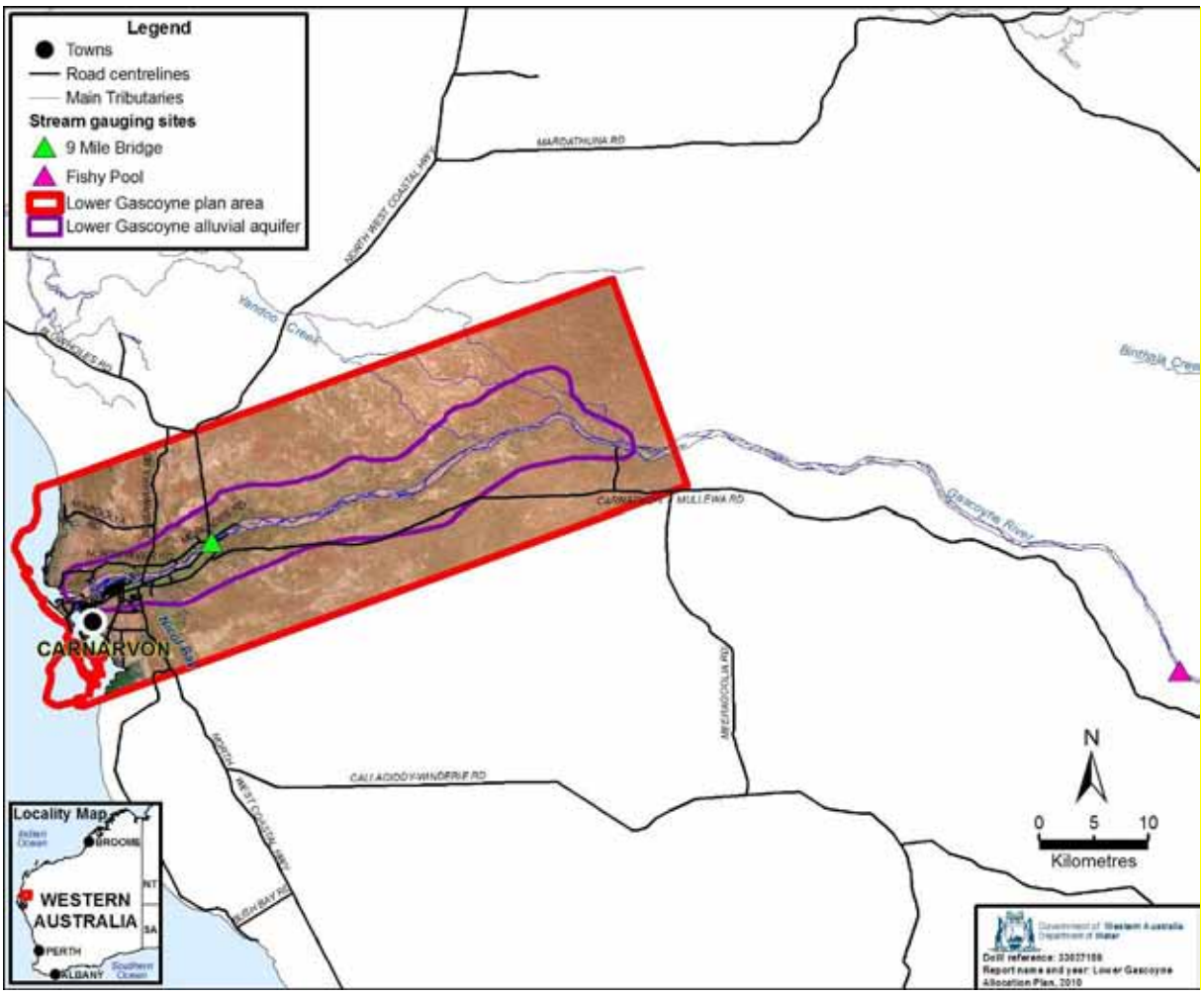


*Figure 5 River gauge locations*

## Groundwater

Water level and water quality measurements from monitoring bores are the main source of information about the state of the aquifers. This information can tell us about groundwater recharge, storage and discharge.

The current monitoring bore network in the plan area consists of 82 bores (Table 7 and Figure 6 and Figure 7).

*Table 7 Monitoring bores in the plan area*

| Monitoring bore series | Period monitored | Parameters monitored | Monitoring frequency | Number of bores |
|---|---|---|---|---|
| **Subarea A** | | | | |
| 'L' Series | 1978–present | • Salinity<br>• Water level | Quarterly | 30 |
| 'OB' Series | 1978–present | • Salinity<br>• Water level | Quarterly | 5 |
| **Total** | | | | **35** |
| **Subarea B–L** | | | | |
| 'L','OB' and 'P' series<br>(Water Corporation) | 1978–present | • Salinity<br>• Temperature<br>• Water level | Quarterly | 47 |
| **Total** | | | | **47** |

Note: All bores are in the Lower Gascoyne alluvial aquifer

In subarea A, 35 monitoring bores have been installed and are monitored on a regular basis by the Department of Water. We also use salinity data from private monitoring bores.

The Department of Water does not monitor groundwater in subarea B–L. In subarea B–L the Water Corporation monitors the resource as part of its water licence conditions. It has a network of 47 bores in this subarea from which it takes water level and salinity readings. The Water Corporation also monitors water quality and groundwater levels in its production bores in this area.

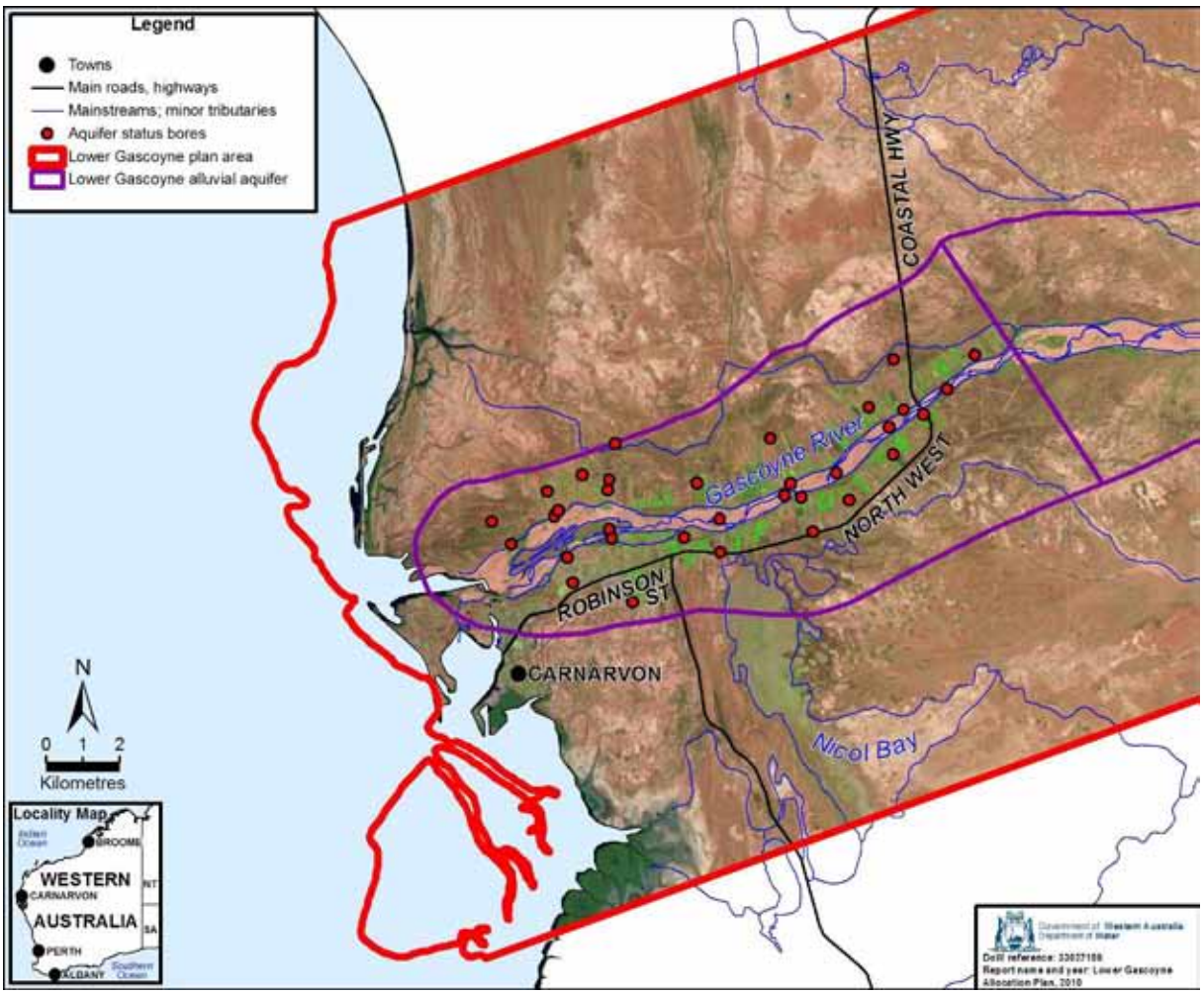


*Figure 6 Subarea A monitoring bores*

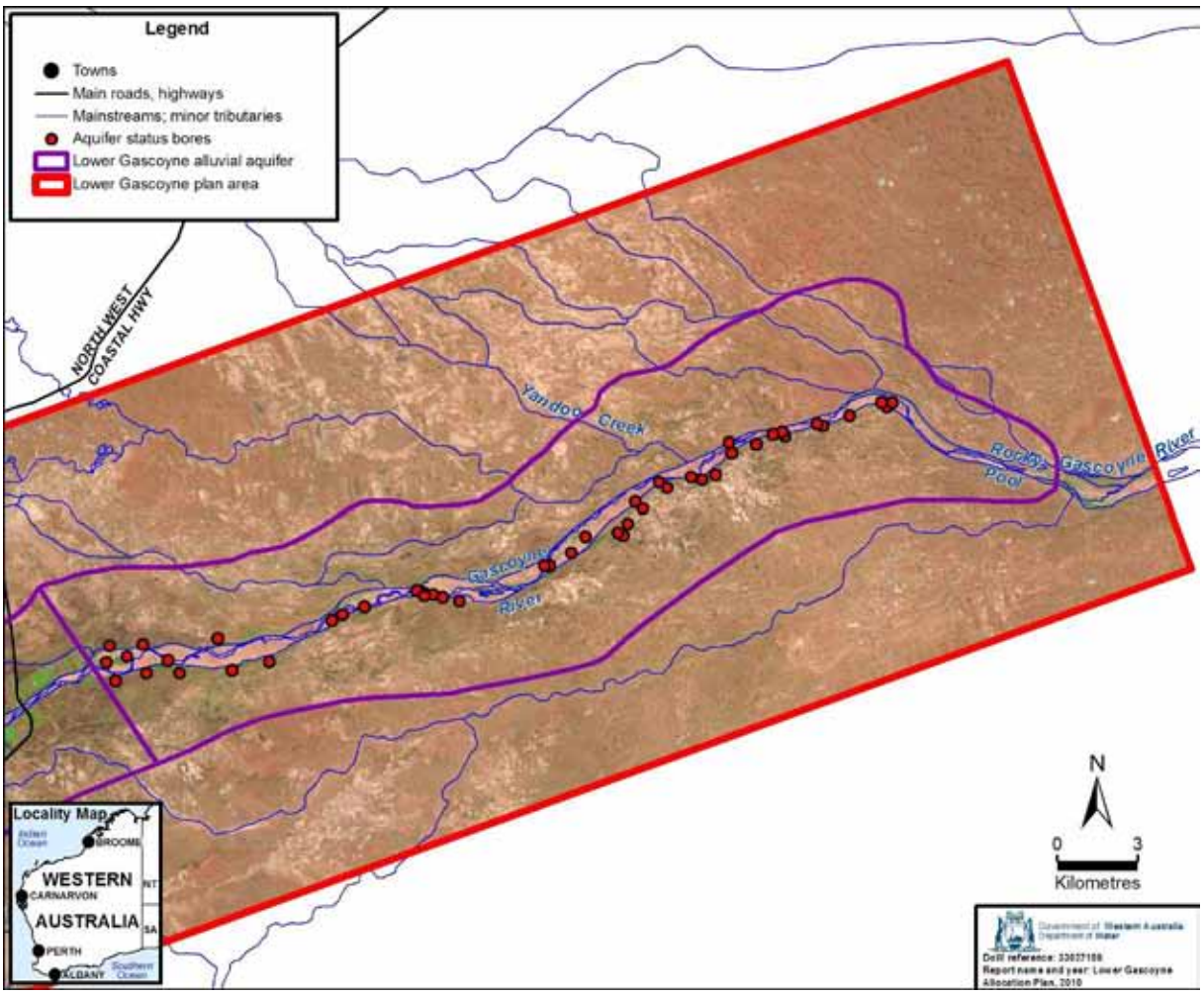


*Figure 7 Subarea B-L monitoring bores*

## 5.3 Review of the monitoring program

The department will review the current monitoring program while the plan is open for public comment. To assess whether the monitoring program is sufficient to meet the needs of the plan or whether we need to improve it, we will:

- identify areas where new bores may be required to ensure sufficient monitoring coverage
- identify ecological monitoring required to understand how ecosystems are dependent on groundwater or specific hydrological regimes.

# 6 Implementing and evaluating the plan

This section describes how the department will implement, evaluate and review the *Lower Gascoyne groundwater and surface water allocation plan.*

## 6.1 Implementing the plan

### Carnarvon Water Allocation Advisory Committee

The role of the Carnarvon Water Allocation Advisory Committee is to advise the Department of Water so there is a balanced, 'whole of system' approach to managing the water resources of the Lower Gascoyne. The committee's scope is consistent with the *Rights in Water and Irrigation Act 1914* Division 3C, Clause 26GM – Functions of Committees. The terms of reference are:

- to provide assistance and advice on matters relating to the functions of the department to the extent that the department asks the committee to do so
- to contribute to the ongoing implementation of the allocation plan
- to provide advice and recommendations for non-conforming licence applications and applications in areas of conflict over water use
- to liaise and consult with local licensees and interest groups to improve awareness and obtain local input on water resource management matters
- to meet and report to the Department of Water on a six monthly basis.

The members of the advisory committee are:

- the Department of Water Mid West Gascoyne regional manager (chair)
- Carnarvon Land Conservation District Committee representative
- Yamatji Land and Sea Council or Indigenous representative
- Gascoyne Water Cooperative representative
- Water Corporation representative
- Five horticultural or grower representatives.

The Department of Water plans to rotate the committee so that ideally no member will serve more than three consecutive three-year terms. At the end of each three-year period, one-third of serving members must renominate.

### Cost recovery

The Government of Western Australian is committed to implementing the National Water Initiative in a manner that is appropriate for Western Australia's people and water resources. At the request of the government, the Economic Regulatory Authority is conducting an enquiry into water resource management and planning charges (ERA 2010). Currently monitoring and management services are provided at no cost to licensees. The government may recover either full or partial costs in the future.

### Management triggers and response

Throughout the life of the plan, the department will need to respond to changes in the status of the groundwater resources in the Lower Gascoyne plan area. The department has set triggers for responses that will be necessary when these situations arise (Table 8).

*Table 8 Management triggers and responses*

| Event | Trigger | Response |
|---|---|---|
| Temporary increase to subarea B–L allocation limit | Subarea A aquifer is depleted below 50 % as measured by the department's aquifer status report | The Department of Water may temporarily increase the allocation limit in subarea B–L by 2.0 GL in a water year. |
| Temporary decrease to subarea B–L allocation limit to protect public water supply. | Department of Water and Water Corporation assess there is a risk to public water supply | The Department of Water may temporarily decrease the allocation limit in subarea B–L to 10.7 GL. |

### Implementation actions

The department has committed to a number of actions to implement this plan (Table 9). We have developed these actions by:

- identifying the gaps in our current knowledge and information
- reviewing current management arrangements
- assessing what information we need for future planning.

*Table 9 Actions for implementing this plan*

| Action | | Responsibility[1] | Timeline |
|---|---|---|---|
| **Resource assessment** | | | |
| 1 | Assess the condition and performance of the groundwater resources. | Mid West Gascoyne region, Water Information and Water Resource Assessment | Quarterly |
| **Allocation planning** | | | |
| 2 | Review the allocation limit decision if new hydrogeological information becomes available that results in a significant change of the yield range. | Mid West Gascoyne region and Water Allocation Planning and Water Resource Assessment | If required |

| Action | | Responsibility[1] | Timeline |
|---|---|---|---|
| 3 | Review aquifer boundaries and plan area if the department receives an application to install a bore upstream of Rocky Pool. | Mid West Gascoyne region and Water Allocation Planning and Water Resource Assessment | If required |
| 4 | Review allocation limits and update plan if there is a change in recharge event frequency and magnitude resulting from climate change. | Allocation planning | If required |
| **Licence compliance** | | | |
| 5 | Undertake meter readings, meter compliance inspections and salinity monitoring for subarea A licence holders. | Mid West Gascoyne region | Monthly |
| **Monitoring** | | | |
| 6 | Review, and amend where appropriate, the current groundwater monitoring program. | Water Resource Assessment and Mid West Gascoyne region | Annually |
| **Communication and evaluation statement** | | | |
| 7 | Produce and publish an annual evaluation statement on the plan and its implementation. | Mid West Gascoyne region and Water Allocation Planning | Annually |
| **Policy** | | | |
| 8 | If a new state-wide policy is released or an amendment to a state-wide policy is released, review the new state-wide policy to ensure it is relevant and appropriate to the Lower Gascoyne region. If it is not appropriate, develop new local licensing rules to meet the intent of the previous state-wide policy and update the plan. | Mid West Gascoyne region and Water Allocation Planning | If required |
| 9 | Review the reserved allocations for public water supply | Mid West Gascoyne region and Water Allocation Planning | Every five years from release of the plan or when more than 50% of the current reserve is licensed to a water service provider |

[1]Departmental branch responsible for the action

To allow for the continual refinement of the understanding and management of the Lower Gascoyne system, the department will undertake or support the following activities (Table 10).

*Table 10 Actions for future planning*

| Action | | Responsibility | Timeline |
|---|---|---|---|
| 1 | Ensure all available information from drilling and hydrogeological investigations are included in the GASFAMS V1 model database. | Mid West Gascoyne region and Groundwater Assessment | Annually |
| 2 | Review the conceptual hydrogeology for the Lower Gascoyne region prior to recalibration of GASFAMS V1. | Groundwater Assessment | If required |
| 3 | Recalibrate GASFAMS V1 | Groundwater Assessment | If required |
| 4 | Refine low aquifer storage level triggers | Groundwater Assessment | End 2011 |
| 5 | Trial an increase in the monthly limit from 10 000 to 12 500 kL/month (from November to January only) to evaluate management and monitoring implications. A minimum of 5 to a maximum of 10 bores selected by the department to be included in the trial. Trial to run for a maximum period of three years (excluding periods of drought). Costs of implementation of the trial are to be met by the licensees. | Mid West Gascoyne region | If community supports action and the department receives additional resources and funding |
| 6 | Investigate trialling the use of water over 1000 mg/L TDS for horticultural purposes to evaluate management and monitoring implications. | Mid West Gascoyne region | |
| 7 | Refine water requirements of groundwater-dependent ecosystems. | Water Allocation Planning | |

## 6.2 Evaluating and reviewing the plan

Table 11 summarises the performance indicators that we will use to measure the performance of this plan against its objectives.

*Table 11 Performance indicators to measure the plan's performance*

**Performance indicators for resource objectives**

| Performance indicator | Resource objective | How will we assess it? |
|---|---|---|
| Declining water quality trend | Objective R1 (subarea A and B–L)<br>To ensure that increased salinity does not cause significant or permanent degradation to the resource. | • Compare salinity contour maps between years to determine if there is a long-term declining water quality trend across the system. |
| Minimum groundwater level and rate of decline | Objective R2 (subarea A and B–L)<br>To maintain groundwater levels and water quality sufficient to meet the minimum in situ value water requirements. | • Number of breaches of environmental requirements in operating strategy for licensees in B–L.<br>• Number of reports and complaints regarding decline in condition of river red gums.<br>• Review selected hydrographs in subarea A to determine the number of times groundwater levels have dropped below 10 m or declined at a rate greater than 4 m/yr. |

**Performance indicators for management objectives**

| Performance indicator | Management objective | How will we assess it? |
|---|---|---|
| Estimated volume of fresh water (less than 1000 mg/L TDS) in older alluvium does not exhibit a downward decline over a period | Objective M1 (subarea A)<br>To maximise the volume of fresh (less than 1000 mg/L TDS) groundwater available for abstraction in the older alluvium during periods of low aquifer recharge.<br>Objective M6 (subarea B–L)<br>To maximise the volume of fresh (less than 1000 mg/L TDS) groundwater available for abstraction in the older alluvium during periods of low aquifer recharge. | • Estimates of depletion percentage in older alluvium aquifer, as given in aquifer status reports. |

**Performance indicators for management objectives**

| Performance indicator | Management objective | How will we assess it? |
|---|---|---|
| Proportion of abstraction from river bed sands compared to older alluvials during unrestricted periods | Objectives M2 and M7 (subarea A & B–L)<br>To maximise the abstraction of surface water flows. | • Percentage of the total abstraction volume abstracted during unrestricted pumping period drawn by licensees with Department of Water approval to undertake unrestricted groundwater pumping. |
| Compliance incidents | Objective M3 (subarea A)<br>To ensure licensees comply with all licence conditions. | • Number of licensees with confirmed breaches of licence conditions. |
| The total volume of licensed entitlements is less than or equal to the allocation limits | Objective M4 (subarea A)<br>To recover licensed entitlements to within the allocation limit. | • Compare the volume of water licensed against the allocation limit for each resource.<br>• Report on the volume of unused water entitlements recouped. |
| Cases of inefficient water use | Objective M5 (subarea A)<br>To promote water use efficiency. | • Number of complaints and verified cases of water wastage. |
| Carnarvon water restrictions | Objective M8 (subarea B–L)<br>To manage abstraction in the area to ensure there is a low risk to the public water supply for Carnarvon. | • No water restrictions applied to Carnarvon public water supply users. |

The department will release an annual statement comparing the actual situation with the plan's objectives. To prepare the statement we will:

- assess the allocation status for each resource and compare it with previous years
- summarise the status of actions required by the plan in the evaluation period
- assess the status and trends of the groundwater resources
- assess performance against the plan objectives
- decide if there is a need to amend or replace the plan.

The annual evaluation statement will be publicly released and available on the department's website or by contacting the Mid West Gascoyne regional office in Carnarvon.

# Glossary

The terms that are used the most in reference to water resource management of the Lower Gascoyne are listed below.

| | |
|---|---|
| **Abstraction** | The permanent or temporary withdrawal of water from any source of supply, so that it is no longer part of the resources of the locality. |
| **Allocation limit** | Annual volume of water set aside for use from a water resource. |
| **Australian Height Datum** | The datum used for the determination of elevations in Australia. The determination used a national network of benchmarks and tide gauges, and set mean sea level as zero elevation. |
| **Catchment** | The area of land from which rainfall runoff contributes to a single watercourse, wetland or aquifer. |
| **Climate change** | A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods. |
| **Consumptive use** | The use of water for private benefit consumptive purposes including irrigation, industry, urban and stock and domestic use |
| **Ecological values** | The natural ecological processes occurring within water-dependent ecosystems and the biodiversity of these systems. |
| **Ecosystem** | A community or assemblage of communities of organisms, interacting with one another, and the specific environment in which they live and with which they also interact, for example a lake. It includes all the biological, chemical and physical resources and the interrelationships and dependencies that occur between those resources. |
| **Environment** | Living things, their physical, biological and social surroundings, and interactions between all of these. |
| **Evaporation** | Loss of water from the water surface or from the soil surface by vaporisation due to solar radiation. |
| **Extraction** | Is the taking of water, defined as removing water from or reducing flow of a waterway or from overland flow. |
| **Fit-for-purpose water** | Water whose quality is suitable for the purpose for which it is intended. It implies that the quality is not higher than needed. |

| | |
|---|---|
| **Flow** | Streamflow. May also be referred to as discharge. |
| **GASFAMS V1 model** | Numerical groundwater model used to predict changes in water quality and quantity under varying conditions. |
| **Groundwater** | Water which occupies the pores and crevices of rock or soil beneath the land surface. |
| **Groundwater-dependent ecosystems** | Those parts of the environment, the species composition and natural ecological processes, of which are determined by the permanent or temporary presence of water resources, including flowing or standing water and water within groundwater aquifers. |
| **Groundwater recharge** | Water that infiltrates into the soil to replenish an aquifer. |
| **Hydrogeology** | The hydrological and geological science concerned with the occurrence, distribution, quality and movement of groundwater, especially relating to the distribution of aquifers, groundwater flow and groundwater quality. |
| **Hydrograph** | A graph showing the height of a water surface above an established datum plane for level, flow, velocity, or other property of water with respect to time. |
| **In situ values** | The ecological, social, cultural and resource values supported by natural hydrological and hydrogeological processes. |
| **Licence** | A formal permit which entitles the abstraction of water from a watercourse, wetland or underground source. |
| **Non-artesian well** | A well, including all associated works, from which water does not flow, naturally to the surface but has to be raised, by pumping or other artificial means. |
| **Over-allocation** | Refers to situations where with full development of water access entitlements in a particular system, the total volume of water able to be extracted by entitlement holders at a given time exceeds the environmentally sustainable level of extraction for that system. |
| **Recharge** | *See* Groundwater recharge. |
| **Reliability** | The frequency with which water allocated under a water access entitlement is able to be supplied in full. Referred to in some states as ‘high security’ and ‘general security’. |

| | |
|---|---|
| **Self-supply** | Water diverted from a source by a private individual, company or public body for their own individual requirements. |
| **Salinity** | The measure of total soluble salt or mineral constituents in water. Water resources are classified based on salinity in terms of total dissolved salts (TDS). The department standard for measurement is micro Siemens (µS/cm). |
| **Social value** | A particular in situ quality, attribute or use that is important for public benefit, welfare, state or health (physical and spiritual). |
| **Social water requirement** | Elements of the water regime that are needed to maintain social and cultural values. |
| **Subarea** | A subdivision within a surface or groundwater area, defined for the purpose of managing the allocation of groundwater or surface water resources. Subareas are not proclaimed and boundaries can therefore be amended without being gazetted. |
| **Surface water allocation subarea** | Areas within a surface water allocation area defined by the Department of Water, used for water allocation planning and management, that are generally hydrologic catchments. |
| **Sustainable yield** | *See* yield |
| **Transferable (tradeable) water entitlement** | The ability to transfer or trade a water entitlement, or a part thereof, to another person within a common water resource. |
| **Watercourse** | (a) Any river, creek, stream or brook in which water flows;(b) Any collection of water (including a reservoir) into, through or out of which any thing coming within paragraph (a) flows;c) Any place where water flows that is prescribed by local by-laws to be a watercourse. A watercourse includes the bed and banks of any thing referred to in paragraph (a), (b) or (c).<br>From the *Rights in Water and Irrigation Act 1914* . |
| **Water entitlement** | The quantity of water that a person is entitled to abstract annually in accordance with the *Rights in Water and Irrigation Act 1914* on a licence. |
| **Water regime** | A description of the variation of flow rate or water level over time. It may also include a description of water quality. |

**Water reserve** An area proclaimed under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or *Country Areas Water Supply Act 1947* to allow the protection and use of water on or under the land for public water supplies..

**Watertable** The saturated level of an unconfined groundwater. Wetlands in low-lying areas are often seasonal or permanent surface expressions of the watertable.

**Wetland** Wetlands are areas that are permanently, seasonally or intermittently waterlogged or inundated with water that may be fresh, saline, flowing or static.

**Yield** The yield is the level of water extraction from a particular system that, if exceeded, would compromise in situ values.

## Volumes of water

| | | | |
|---|---|---|---|
| One litre | 1 litre | 1 litre | (L) |
| One thousand litres | 1000 litres | 1 kilolitre | (kL) |
| One million litres | 1 000 000 litres | 1 megalitre | (ML) |
| One thousand million litres | 1 000 000 000 litres | 1 gigalitre | (GL) |

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**Datum and projection information**
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Horizontal datum: Geocentric Datum of Australia 94
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mxd\
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**Sources**

The Department of Water acknowledges the following datasets and their custodians in the production of this map:

Towns –DLI – Current

Road Centrelines – DLI – Current

Hydrography, Linear (Hierarchy) – DoW – 05/11/2007

DWAID Aquifers – DoW – Current

WIN Surface Water Sites-Stream Gauging (DoW) – DoW – Continual

WIN Sites – DoW - Continual

WA Coastline, WRC (Poly) – DoW – 20/07/2006

Australian Coastline Derived - DoW – 30 December, 2009

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