



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

Lower Gascoyne

water allocation plan



Looking after all our water needs

Water resource allocation
planning series
Report no 46
October 2011

Please note the update to the 2011 Lower Gascoyne water allocation plan as of March 2015

The Department of Water amended the 2011 *Lower Gascoyne water allocation plan*, in March 2015 as an outcome of the 2013–2014 annual evaluation of the plan.

The evaluation identified a number of local licensing policy changes and improvements to when a Low Aquifer Storage event is triggered. These changes are essential to adapting our water management in the plan area.

The tables shown below alter or replace the existing tables in the 2011 *Lower Gascoyne water allocation plan*. For more information please contact the Gascoyne District office in Carnarvon on 08 9941 6100 or email allocation.planning@water.wa.gov.au.

Table 4 Local licensing rules in the plan area

The text in Table 4 sections 5, 6 and 8 was revised. This information should be read in conjunction with the full Table 4 on pages 16–19 of the 2011 plan.

Group	Local licensing rules
<i>Local licensing rule 5.2 replaces the existing text in Table 4, page 17.</i>	
5 Mechanism for increasing entitlements	<p>5.2 The department will consider applications for a temporary increase in the licensed entitlement in Subarea A if the following criteria are met:</p> <ul style="list-style-type: none"> • Licensees need to have legal access to all draw points. • Maximum annual increase of up to 10 000 kL/year for any individual property/prolongation • Maximum licensed entitlement of 120 000 kL/yr for any individual property/prolongation. • Applicants must have a sandspear or bore screened in the Riverbed Sands • Salinity needs to have remained below 78.6 mS/m EC at 25°C for the preceding three year period. The licensee must make their bore available to be sampled. The onus is on the licensee to ensure that the department undertakes a minimum of four salinity samples per year, if they wish to apply for an increase. • Water usage for the licensee seeking the increase needs to have been 90% or more of the licensed entitlement for the previous three years • Any water abstracted during declared unrestricted pumping periods will not count towards water abstraction for the purposes of this criteria • Licensees seeking an increased entitlement need to demonstrate to the satisfaction of the department that they are utilising the department's best management practices for water abstraction. • The licensee must have complied with the terms and conditions of any licences held • Licensees must undertake and submit results of any additional monitoring required to the department. • A licensee who has increased their licensed entitlement through trade or transfer will not be eligible to apply for an allocation increase from the department in that year.
<i>Local licensing rule 6.3 is a new rule and will be applied in addition to rule 6.1 and 6.2 on Table 4, pg. 18</i>	
6 Trading and transfers	<p>6.3 In order to protect the resource from declining water quality (salinity) caused by over-abstraction of groundwater, short-term (12 months) applications to transfer water abstraction between the Northern Borefield and the Southern Borefield draw points (north and south of the Gascoyne River) in Subarea B–L are unlikely to be supported.</p>

Table 4 (continued)

Local licensing rules in the plan area

The text in Table 4 sections 5, 6 and 8 was revised. This information should be read in conjunction with the full Table 4 on pages 16–19 of the 2011 plan.

Group	Local licensing rules
<i>Local licensing rule 8.5 is a new rule and will be applied in addition to rule 8.1 to 8.4 on Table 4, pg. 18</i>	
8 Managing water quality	<p>8.5 The Department of Water will notify licensees when water quality (salinity) sampling detects elevated salinity (above 176 mS/m EC at 25°C) in the Riverbed Sands formation of the Lower Gascoyne Alluvial aquifer following a saline river flow.</p> <p>The department may call for short-term licence applications to access this higher salinity groundwater. The licence will include a condition that states the new salinity threshold trigger (up to 214.5 mS/m EC at 25°C).</p> <p><i>Note: The measure of total soluble salt or mineral constituents in water (salinity) is classified in terms of electrical conductivity (EC) at a standard measurement of millisiemens per meter at 25 degrees Celsius (mS/m EC at 25°C).</i></p>

Table 5

Management triggers and response

The text in Table 5 below was updated and replaces the existing table on page 23 of the 2011 plan.

Event	Trigger	Response
Temporary increase to Subarea B-L allocation limit	After 18 months of no river flow or if the department determines Low Aquifer Storage in Subarea A, based on the amount of usable freshwater storage in the resource, prior to this time.	The Department of Water may temporarily increase the allowable draw in Subarea B-L to 17.5 GL/yr.
Temporary decrease to Subarea B-L allocation limit to protect public water supply and in-situ values.	Department of Water and Water Corporation assess there is a risk to public water supply or the Department of Water assesses there is a risk to in-situ values.	The Department of Water may temporarily limit the allowable draw in Subarea B-L to 10.7 GL/yr. The public water service provider will retain the ability to access 100% of their entitlement and all other licensees will be eligible to access a percentage of their entitlement as directed by the department.

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Foreword



The Gascoyne River ground and surface water resources are vital to the Carnarvon community, in particular for town supply and the irrigated horticulture industry.

Parts of the plan area are over-allocated which means that more water was allocated than is sustainable to take each year. Historically many water users were not able to abstract their full entitlement volume without seeing salinity impacts which affects crop production.

A secure water entitlement lets the horticulturalists of Carnarvon know that a good quality supply will continue to be available into the future. In turn, this provides confidence to the organisations that finance agricultural enterprises that they can safely continue to invest in this important industry.

I am satisfied that the *Lower Gascoyne water allocation plan* provides the highest possible security water entitlements for all users in a complex, variable flood driven system. It encourages the redistribution of abstraction from poorer water quality areas to higher water quality areas to maximise the amount of water available for productive use.

The Gascoyne Foodbowl Initiative is an important project to boost the region, and Western Australia's food production capacity. I am therefore also very pleased that the ongoing investments made in investigations, modelling and planning of the water resource by the Department of Water resulted in innovative policies to support growing demand through the Foodbowl initiative.

However, I also strongly back the need for all water users in Carnarvon to take responsibility to use water efficiently and productively. This plan clearly indicates that given the variable recharge events, making the best use of water is paramount to allow Carnarvon and its industries to continue to grow. While the plan sets the right framework for water efficiency, much of the work to deliver efficiencies will be in the hands of water users themselves through day to day operation.

A handwritten signature in black ink that reads "Bill Marmion". The signature is written in a cursive, slightly slanted style.

Hon Bill Marmion MLA, BEng, MBA
Minister for Environment; Water



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Summary

Lower Gascoyne water allocation plan

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

The groundwater and surface water resources in the Lower Gascoyne area are critical for the town water supply for Carnarvon and the local horticultural industry. The area depends on periodic flood events to recharge the groundwater system and generate surface stream flows. Over-abstraction, especially in years where there is no river flow, can cause salinity problems which subsequently affect crop production. This means that in many years there is a very fine supply-demand balance and the water resources need to be managed very carefully.

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

The *Lower Gascoyne water allocation plan* was developed to:

- support further horticultural development in the Carnarvon area by maximising the volume of water available for abstraction and specifying the options for managing the resource
- update the management arrangements set out in the 2004 plan to better manage the impact of water abstraction on the water resource and the ecological and social values in the plan area.

The plan sets out the Department of Water's approach to water allocation in the Lower Gascoyne plan area. Through the plan we balanced the volume of water made available for consumptive use with the need to protect the quality of the resource and in situ values. Due to the periodic nature of recharge events, the amount of water actually available varies from year to year, which can affect the reliability of supply.

Summary continues

Groundwater yields were derived from modelling and the allocation limits were set at the yields which delivered an 80 per cent reliability of supply. The allocation limits for each of the water resources are summarised below

Resource	Allocation limit (GL/yr)
Groundwater resources	
Lower Gascoyne alluvial subarea A	6.1
Lower Gascoyne alluvial subarea B-L	15.5
Yandoo surficial	0.1
Total	21.7
Surface water resources	
Carnarvon irrigation district	Not set

With improved information and updated licensing rules we increased allocation limits in the plan area. While licensed entitlements in subarea A still exceed the allocation limit, more water is available from subarea B-L. Transfer of water, localised options to increase take and efficient use of water will enable further development without risking water quality impacts.

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.

Chapter one

Introduction

The groundwater and surface water resources in the Lower Gascoyne area are critical for the town water supply for Carnarvon and for the local horticultural industry. The area depends on periodic flood events to recharge the groundwater system and generate surface stream flows. Over-abstraction, especially in years where there is no river flow, can cause salinity problems which affects crop production. This means that in many years there is a very fine supply-demand balance and the water resources need to be managed very carefully.

This plan maximises the amount of ground and surface water available for licensed use in the Lower Gascoyne 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. Demand for water from both subareas is increasing, and the expansion of the Carnarvon horticultural industry is a priority for the government.

1.1 Why have we developed a new plan?

To support long-term development in the Lower Gascoyne plan area the department needed to confirm the volume of fresh water that can be sustainably abstracted from the system.

The Government of Western Australia's Gascoyne Foodbowl Initiative will increase the agricultural potential of the region. This plan confirms the amount of groundwater resources available from the lower Gascoyne River to support the expansion of the horticultural industry.

In the 2004 plan, *Managing the groundwater resources of the Lower Gascoyne River (Carnarvon) WA*, we committed to review water allocation by 2010.

Since the 2004 plan the Department of Water collected new information and has undertaken groundwater modelling to determine a more accurate sustainable yield. Using this work, we set the allocation limit as high as possible while achieving an acceptable reliability of supply for all users and protecting in situ values.

To manage any risk to the water resource we also updated the licensing rules. We revised the monitoring program so we can check that we are effectively managing the system.

1.2 Scope of the plan

The plan establishes groundwater allocation limits and groundwater and surface water licensing rules for the proclaimed areas within the Lower Gascoyne 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 abstraction
- our approach to managing groundwater 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 water allocation plan complements water source protection, flooding and drainage management and land planning in the area. By clearly specifying the volume of water available and our approach for releasing it, this plan also supports the Gascoyne Foodbowl Initiative and land planning. In a broader context, by recognising and putting in place measures to help protect the groundwater-dependent values in the plan area, the plan aligns with the natural resource strategy for this region.

The plan supports licensing under the *Rights in Water and Irrigation Act 1914*. The approach and structure of this plan is consistent with the intent and purpose of changes to legislation under consideration, and with the National Water Initiative.

This plan is accompanied by the *Lower Gascoyne allocation methods report* (DoW 2011a) which provides further technical detail to explain the Lower Gascoyne allocation decisions.

The *Carnarvon artesian basin water management plan* (DoW 2007) establishes the allocation and licensing approach for the confined artesian aquifers in the plan area.

1.3 The plan area

1.3.1 Location

This plan applies to the lower Gascoyne River, an area defined as the Lower Gascoyne 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 km² (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 1) 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 1
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 Carnarvon water reserve, to protect the water quality of the Carnarvon Town water supply, is within the plan area. Refer to the *Carnarvon water reserve drinking water source protection plan* (DoW 2010a) for further detail.

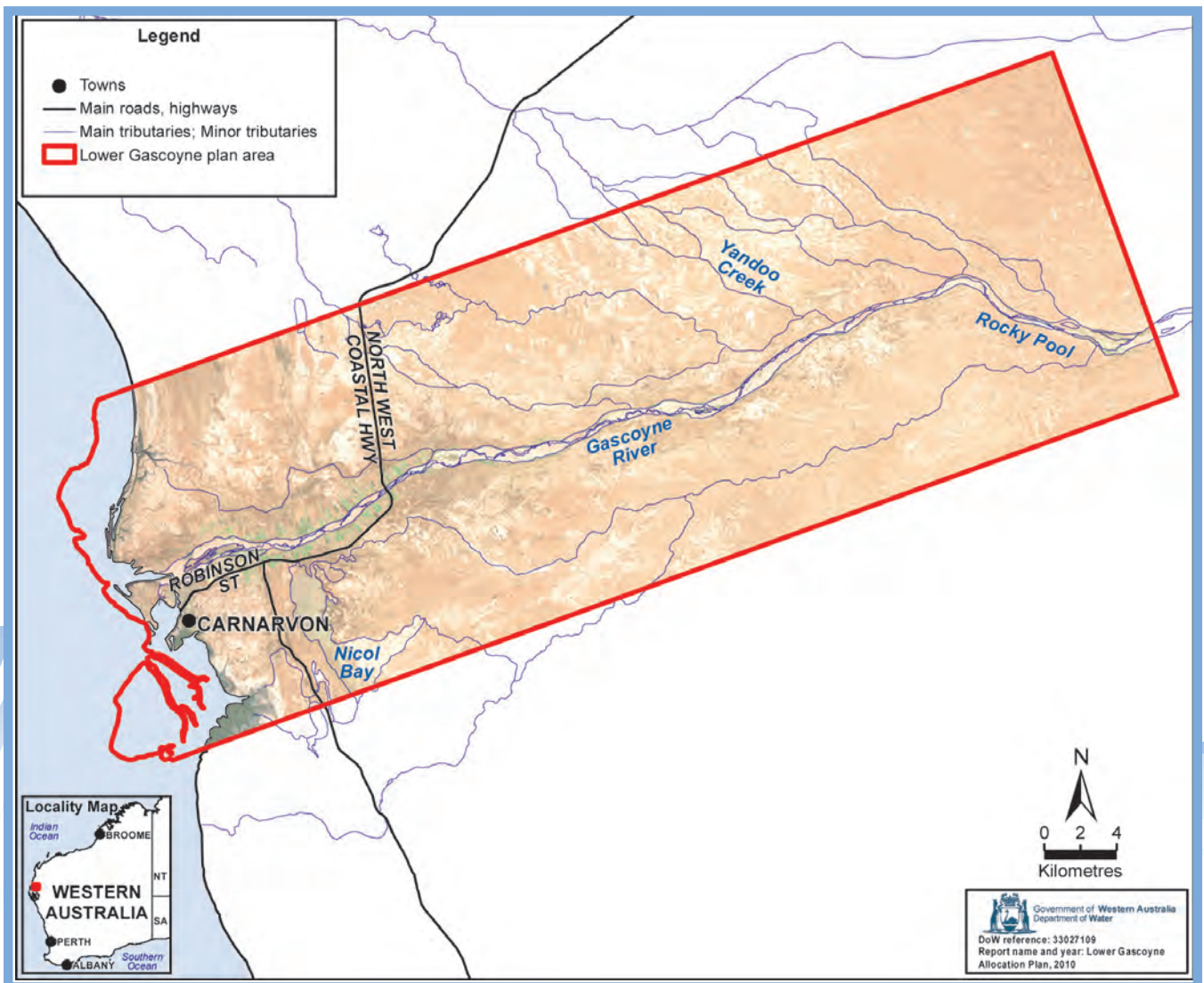


Figure 1
Lower Gascoyne water allocation plan area

Lower Gascoyne water allocation plan

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 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.

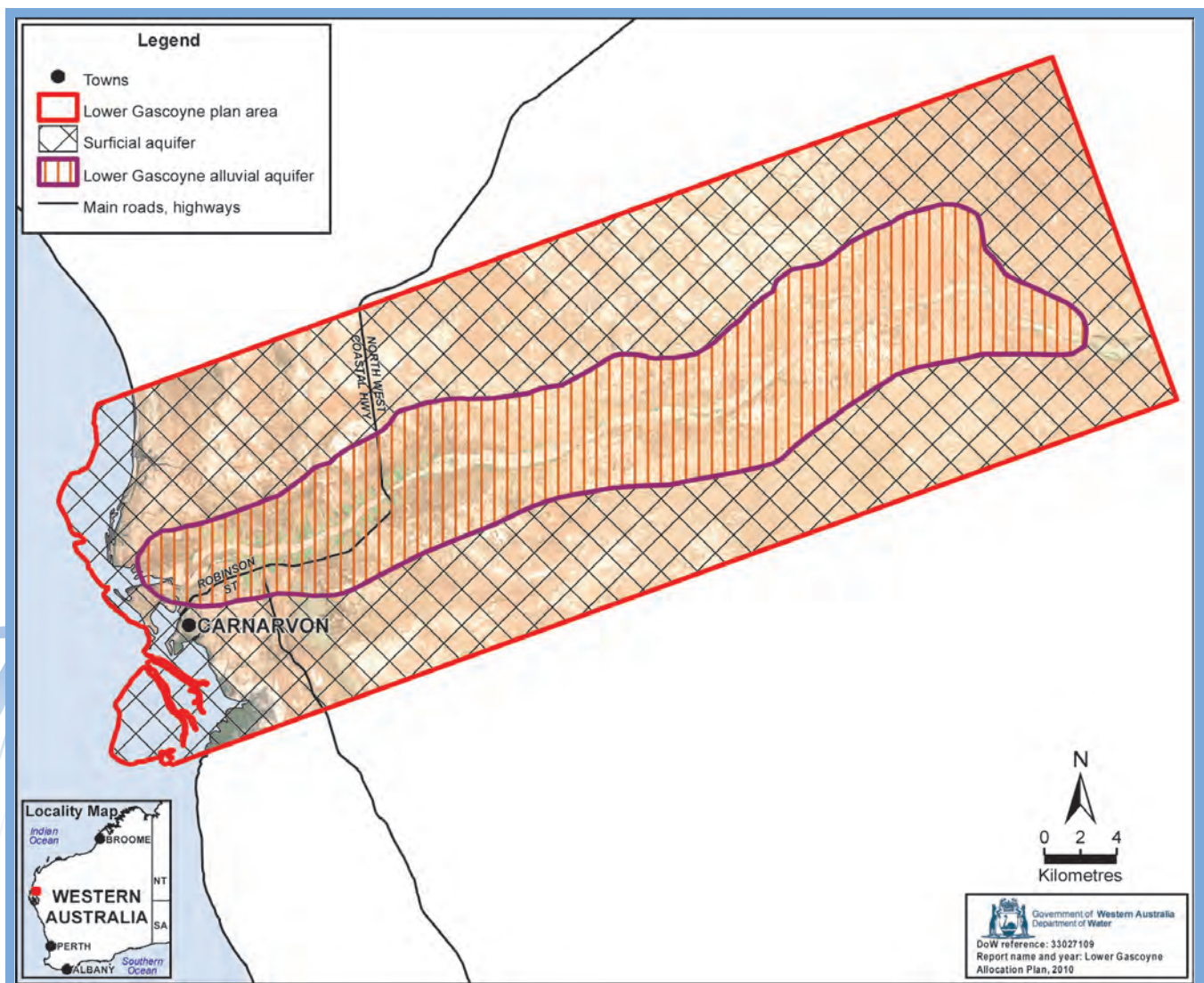


Figure 2
Aquifer boundaries in the plan area

Lower Gascoyne water allocation plan

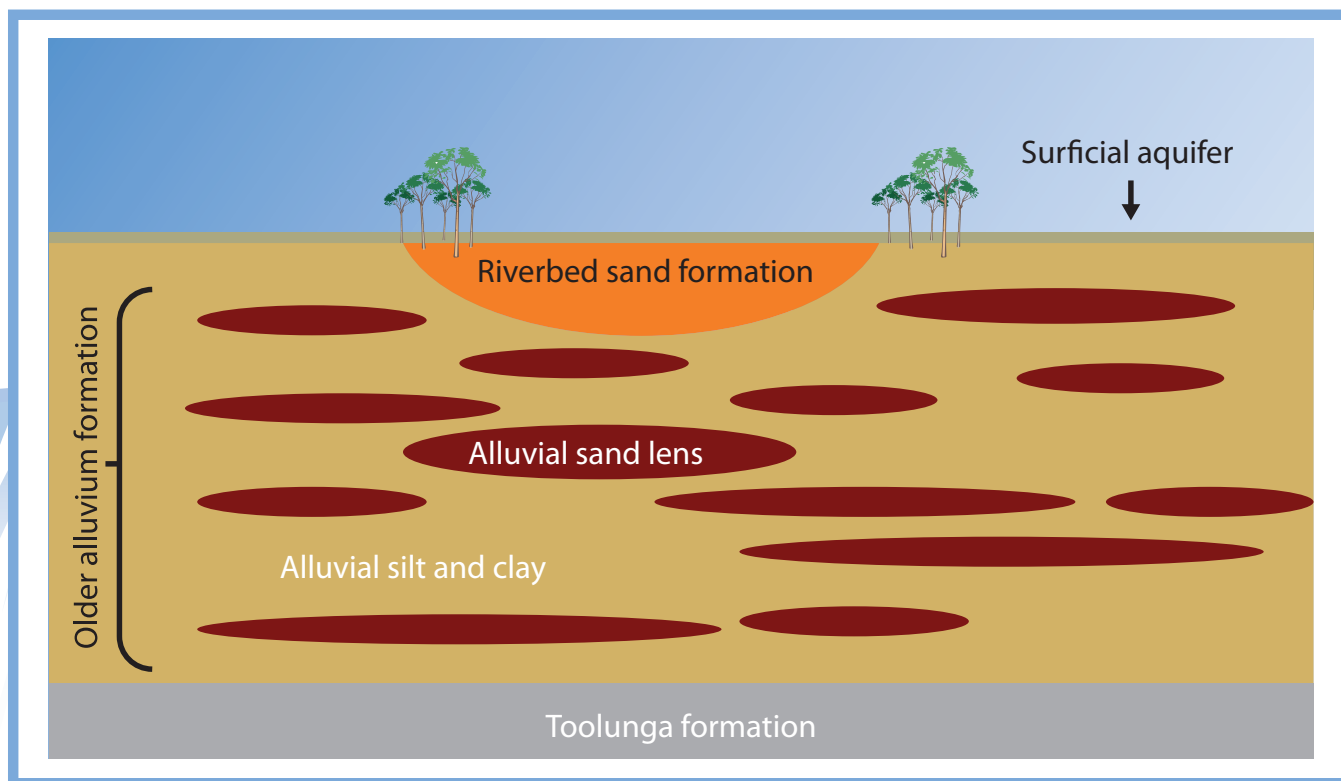


Figure 3
Aquifer cross-section

Lower Gascoyne water allocation plan

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 were defined (Figure 4).

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

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

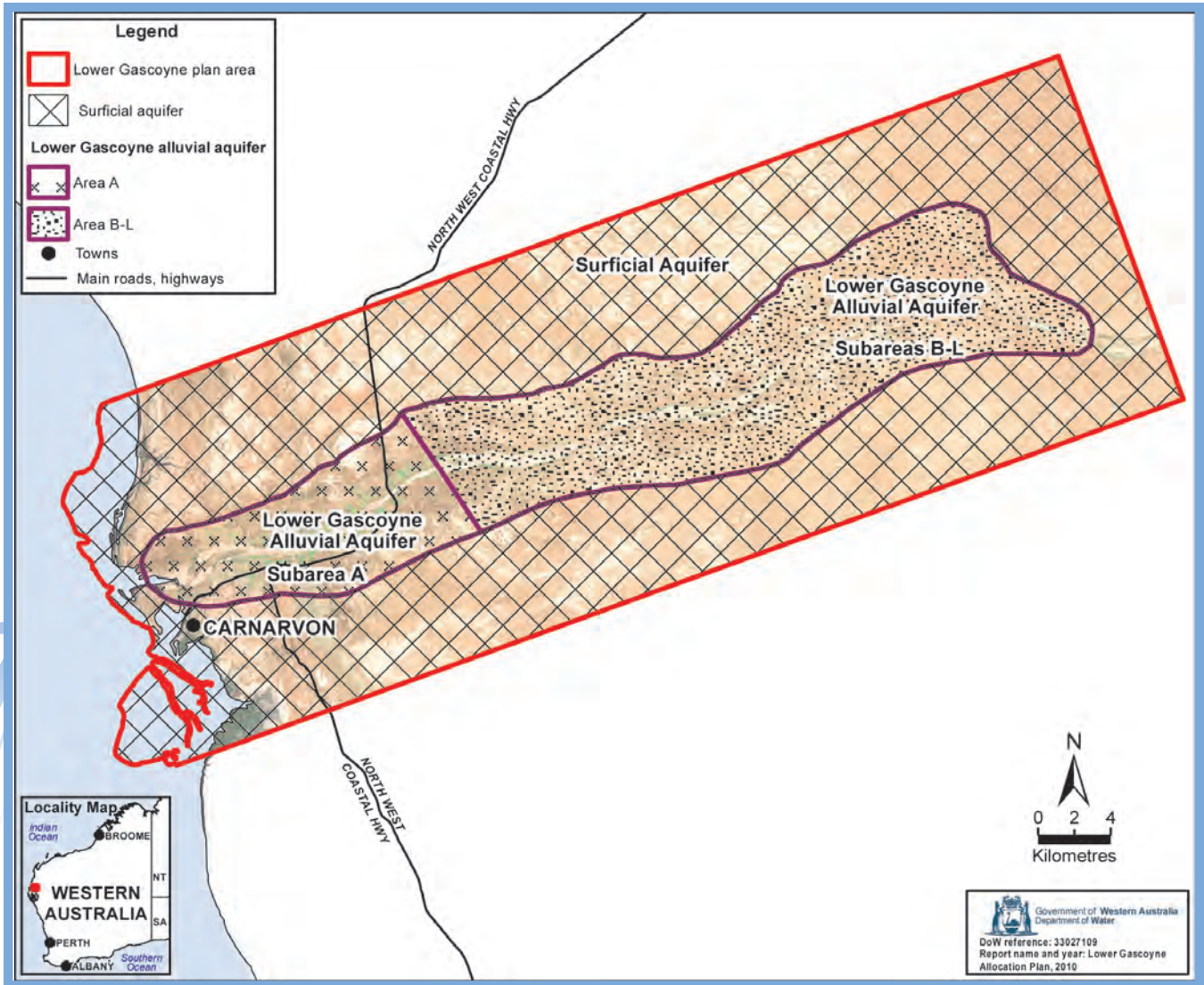


Figure 4
Resource boundaries

Lower Gascoyne water allocation plan

1.5 When and for how long will this plan apply?

The *Lower Gascoyne water allocation plan* is implemented from the day it is endorsed by the Minister for Water. The allocation limits came into effect on 1 January 2011 after this plan was released for public comment. This

plan replaces *Managing the groundwater resources of the Lower Gascoyne River (Carnarvon) WA (2004)*.

In seven years we will review the plan and determine if amendments to the plan or a new plan are required.

Chapter two

What the plan will achieve

The Lower Gascoyne plan maximises the volume of water for abstraction while minimising the risk to groundwater quality, individual licensee supply reliability, and to in situ values. The Department of Water will use this plan to achieve the following outcomes:

- continued provision of good quality water from subarea B-L to meet town water supply demand
- growth of the horticultural industry is supported by making additional water available in subarea B-L, through water service providers
- permanent salinity damage to the water resource is avoided by addressing the over-allocation in subarea A and redistribute water abstraction from areas of poor water quality to areas of high water quality

The effectiveness of this plan will be measured and evaluated against the water resource and water management objectives 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 water resource.
- R2 To maintain groundwater levels and water quality sufficient to meet the minimum in situ value water requirements.

2

What we want this plan to achieve and how we will measure it

Water management objectives

The water management objectives of this plan are:

Subarea A

- M1 To maximise the volume of fresh (less than 176 mS/m EC at 25°C) 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 176 mS/m EC at 25°C) 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 increases the precision of water management in this area. It is a step towards the long-term aim of improving our knowledge and providing water service providers and individual licensee's a context to refine the way infrastructure is constructed and operated to ensure the maximum sustainable volume of water can be abstracted.

2.2 How will the plan achieve its objectives?

The remaining sections of the plan explain how we will manage water allocation in the lower Gascoyne to achieve the objectives of the plan.

To meet the objectives of this plan we will:

- manage to allocation limits for each sub area described in section 3
- apply the department's approach for allocating and licensing water set out in section 4
- licence the abstraction of water according to the licensing rules in section 4
- monitor the groundwater resource as explained in section 5
- implement the actions described in section 6.1.

Chapter three

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 components:

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

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

The allocation limits for subareas A and B-L are presented in Table 2 for the three groundwater resources in the Lower Gascoyne Plan area. For details of the methods and information we used to set allocation limits see *Lower Gascoyne methods report* (DoW 2011a). We did not set a surface water allocation limit for the Carnarvon irrigation district as flows are highly variable from year to year, and pumping is managed through rules.

It is important to note that although an allocation limit was 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. In the Lower Gascoyne area, increased salinity is often a limiting factor for the amount of fresh water that can be abstracted at a particular point.

To ensure the risk of long term increases in salinity are minimised it is important that both allocation limits and salinity thresholds are used to manage abstraction. Groundwater modelling shows that using a salinity threshold alone does not prevent movement of salts into the system.

The department had no record of any exempt unlicensed water use within the plan area when this plan was prepared. Please see the department's Water Register (www.water.wa.gov.au) or contact our Mid West Gascoyne office for up-to-date information on water availability.

3

Allocation limits

Table 2
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	15.5	11.9	1.8	0.0	1.8
Yandoo surficial	0.1	0.1	0.0	0.0	0.0
Total	21.7	18.1	1.8	0.0	1.8
Surface water resources					
Carnarvon irrigation district	Not set	-	-	-	-

Chapter four

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 for 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 individual abstraction of 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 by ensuring an individual has secure long term water supply
- protect other users
- protect water-dependent in-situ values.

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 clause 7 (2) of Schedule 1 of the Act 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 apply 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 of 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:

- fire fighting 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

Through this plan the department made additional water available for allocation in subarea B-L. Any water abstracted from subarea B-L must be distributed through a water service provider and used within the plan area for irrigated horticultural or public water supply purposes. Water licences will not be issued to individuals in this area. In line with the direction set by the Gascoyne Foodbowl Initiative Ministerial Reference Group, the department will only release water from the general licensing component of subarea B-L for the purpose of irrigation to support

the priorities of the Gascoyne Foodbowl Initiative. Similarly, the department will only release water from the public supply reserve component of subarea B-L for the purposes of potable public water supply.

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 and amend the licensed entitlement volume to match the existing land area in accordance with *Statewide policy no. 11 – Management of unused licensed water entitlements* (WRC 2003).

Trading and transfers

Trades between self supply irrigators are not likely to be practical due to the location specific nature of the resource. There is a very high degree of variation in the aquifer as the older alluvial aquifer is a series of interconnected sand lenses rather than a continuous thickness of sediments (refer to section 2.4 of *Lower Gascoyne allocation methods report* (DoW 2011a)). Different areas in the aquifer have varying water quality and the interconnections are very difficult to accurately map and understand. This means that it is very difficult to predict what the effects of increased abstraction pressure due to trading may be on water quality and reliability.

Feedback from the community during consultation indicated that the concept of trading in this resource was not supported due to the level of risk to the reliability of supply and water quality for adjacent users.

The department is likely to support the movement of water where water is drawn from the transferor's prolongation

and piped to the point of use, where the water was used on average for the previous three years.

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. November 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 focus of the review will be guided by those bores or prolongations monitored by the department where salinity levels exceed 146.5 mS/m EC at 25 °C 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 all water recouped through the review (see local licensing rule 5.1). This will enable the department to gradually reduce the total of entitlements to the allocation limit over time to recover the resource. Growers wishing to increase their water entitlements will be able to apply through an expression of interest process, subject to meeting the requirements under local licensing rule

5.1. Growers are also encouraged to explore opportunities for piping water from other licensees' bores or purchase or trade scheme water entitlements.

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, under the provisions of the Act.

Compliance and enforcement

The department manages water on behalf of the state under the *Rights in Water and Irrigation Act 1914*. This legislation requires appropriate authorisation to abstract ground or surface water in the Lower Gascoyne plan area. If the appropriate authorisations are not obtained or the conditions of an authorisation are breached the department will take appropriate compliance or enforcement action. This may include amendment or revocation of a licence or a fine.

4.3 Licensing policies that apply state-wide

The department's state-wide strategic and operational policies apply to the Lower Gascoyne plan area. Table 3 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>.

The local licensing rules may be updated throughout the life of the plan.

Table 3
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: Section 4.11 (wasting of water)
<i>Strategic policy no. 5.03 – Metering the taking of water (DoW 2009c)</i> <i>Guidelines for water meter installation (DoW 2009a)</i> <i>Rights in Water and Irrigation (Approved Meters) Order 2009</i>	Outline the department’s position on metering the taking of water in Western Australia. Of particular note is: Section 3.14 (offence to damage or interfere with a water meter)
<i>Operational policy no. 5.12 – Hydrogeological reporting associated with a groundwater well licence (DoW 2009d)</i>	Describes: <ul style="list-style-type: none"> • hydrogeological information the department may request from the licence applicant to complete the assessment of the licence application • when and where monitoring bores may be required • the structure of monitoring reports that the licensee may be required to regularly submit to the department • groundwater-dependent ecosystem assessments.
<i>Operational policy no. 5.11 – Timely submission of required further information (DoW 2009e)</i>	Describes how the department manages the timelines that a licensee has for submitting any additional requested information as part of their licence application.
<i>Strategic policy no. 1.01 – Managed aquifer recharge in Western Australia: allocation and water quality management (DoW 2009f)</i>	Describes how the department would deal with managed aquifer recharge if it was considered as an option in the plan area.
<i>Operational policy no. 1.2 – Policy on water conservation and efficiency plans: achieving water use efficiency gains through water licensing (DoW 2009g)</i>	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, de-water, drainage and stormwater reuse and recycled water) in a water conservation and efficiency plan.
<i>Operational policy no. 5.08 – Use of operating strategies in the water licensing process (DoW 2010b)</i>	Describes: <ul style="list-style-type: none"> • which water licence applicants are likely to require operating strategies • how operating strategies form part of the conditions of a water licence • how licence applicants should develop an operating strategy • the licensee’s responsibilities in complying with an operating strategy.
<i>Operational policy no. 5.13 – Water entitlement transactions for Western Australia, (DoW 2010c)</i>	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: <ul style="list-style-type: none"> • new landowners must apply to transfer water entitlements within 30 days of land sale.

4.4 Local licensing rules

The horticultural industry and the department already have rules in place to manage water abstraction in the Lower Gascoyne 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 allowed us to build on these management strategies.

These local licensing rules are set out in Table 4. 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 4
Local licensing rules in the plan area

Group	Local licensing rules
1 Water accounting year	1.1 The water accounting year begins on 1 January and ends on 31 December of the same year.
2 All Metering	2.1 All ground or surface water abstracted must pass through a department approved cumulative flow meter (including water abstracted during unrestricted flow periods).
	2.2 Water abstracted under a surface water licence must be metered separately from water abstracted under a groundwater licence.
	2.3 The licensee must ensure that all water pumped is of a meterable quality (i.e. free of mud, sand and large particles) to prevent damage to the meters.
	2.4 It is the responsibility of a licensee to advise the department if the meter is not working.
3 Maximum monthly draw limit	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.
	3.2 Surface water abstraction is restricted to a maximum of 20 000 kL/ month.

Table 4 (continued)
Local licensing rules in the plan area

Group	Local licensing rules
<p>4 Unrestricted groundwater pumping periods</p>	<p>4.1 At its discretion, the department may declare unrestricted groundwater pumping from the Riverbed Sands Formation in subarea A and subarea B-L. Unrestricted groundwater pumping will start on the first day of the calendar month 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).</p>
	<p>4.2 Unrestricted groundwater pumping will cease at the end of a calendar month on the departments declaration. 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 78.6 mS/m EC at 25°C.</p>
	<p>4.3 Licensees must demonstrate to the satisfaction of the department that they have a spearpoint or one of their bores has a screen in the Riverbed Sands Formation to be eligible to undertake unrestricted pumping.</p>
	<p>4.4 During periods of declared unrestricted pumping, eligible licensees must draw groundwater from the Riverbed Sands</p>
	<p>4.5 Water abstracted by eligible licensees during a declared unrestricted pumping period does not count towards the licensee's annual entitlement but must continue to be metered.</p>
	<p>4.6 Maximum monthly abstraction limits do not apply to eligible properties during periods of unrestricted pumping.</p>
	<p>4.7 Abstraction during unrestricted pumping from properties with access only to the Older Alluvium will count towards their annual entitlement but will not be considered during the assessment of an application for increased entitlement.</p>

Table 4 (continued)
Local licensing rules in the plan area

Group	Local licensing rules
<p>5 Mechanism for increasing entitlements</p>	<p>5.1 The department will release up to 50% of the volume recouped over the previous 12 months in subarea A through an expression of interest process. This process will occur once a year.</p>
	<p>5.2 The department will consider applications for an increase in the licensed entitlement if the following criteria are met:</p> <ul style="list-style-type: none"> • Licensees need to have legal access to all draw points. • Maximum annual increase of up to 10 000kL/year for any individual property/prolongation • Maximum licensed entitlement of 120 000kl/yr for any individual property/prolongation. • Applicants must have a sandspear or bore screened in the Riverbed Sands • Salinity needs to have remained below 78.6 mS/m EC at 25°C for the preceding three year period. The licensee must make their bore available to be sampled. The onus is on the licensee to ensure that the department undertakes a minimum of four salinity samples per year, if they wish to apply for an increase. • Water usage for the licensee seeking the increase needs to have been 90% or more of the licensed entitlement for the previous three years • Any water abstracted during declared unrestricted pumping periods will not count towards water abstraction for the purposes of this criteria • Licensees seeking an increased entitlement need to demonstrate to the satisfaction of the department that they are utilising the department’s best management practices for water abstraction. • The licensee must have complied with the terms and conditions of any licences held • Licensees must undertake and submit results of any additional monitoring required to the department. • A licensee who has increased their licensed entitlement through trade or transfer will not be eligible to apply for an allocation increase from the department in that year.
	<p>5.3 The department reserves the right to review any increase in entitlements or the conditions on a licence if an increasing trend in salinity levels is detected or if licensees do not meet the criteria in 5.2 at any time.</p>
	<p>5.4 If the total volume of water requested by eligible applicants is greater than the volume of water recouped available for release, the department will distribute volumes to lower risk draw points, based on water quality data.</p>
	<p>5.5 The department will consider advice from the Carnarvon Water Allocation Advisory Committee (CWAAC) in the assessment process where required.</p>

Table 4 (continued)
Local licensing rules in the plan area

Group	Local licensing rules
6 Trading and transfers	6.1 Water drawn from the originating prolongation to the point of use is eligible to be traded or transferred.
	6.2 Only water which was used for the previous three years is eligible to be traded or transferred.
7 26D licence conditions on bore construction	7.1 All new bores must be more than 30 m from any existing bores on neighbouring properties or prolongations 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.
8 Managing water quality	8.1 All bores must be able to be individually sampled.
	8.2 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 176 mS/m EC at 25 °C is reached.
	8.3 When Department of Water monitoring detects salinity levels exceeding 146.5 mS/m EC at 25 °C in individual subarea A bores, the department will notify licensees of recorded high salinity levels.
	8.4 Where water abstracted is for use on land zoned for non-horticultural purposes the licensee must cease pumping when a salinity level of 467 mS/m EC at 25 °C is reached.
9 Water contamination	9.1 All subarea A and B-L licensees must have a mechanism in place which prevents backflow into the aquifer to a standard approved by the department and maintained to the department's satisfaction.
	9.2 All subarea A licensees who also draw from the scheme supply are required to have a back-flow prevention device between the two systems.

Table 4 (continued)
Local licensing rules in the plan area

Group	Local licensing rules
<p>10 Groundwater-dependent ecosystems</p>	<p>10.1 Licensee's must demonstrate to the department's satisfaction that there is no impact on Rocky Pool as a result of groundwater abstraction.</p>
	<p>10.2 No surface water abstraction is permitted from Rocky Pool.</p>
	<p>10.3 No surface water abstraction is permitted from Chinaman's Pool except when unrestricted pumping is declared.</p>
	<p>10.4 The department will not issue any new groundwater licences in Chinaman's Pool reserve.</p>
	<p>10.5 Licensee's 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.</p> <p>Should groundwater levels fall to within 10% of historical minimum water levels, licensees must:</p> <ul style="list-style-type: none"> • start to monitor tree stress using a standardised, department approved monitoring program • modify the abstraction regime based on the results of tree stress monitoring and directions from the department • implement water efficiency measures, including residential efficiency programs.
<p>11 Using the public water supply reserve for other purposes</p>	<p>11.1 Water from the public water supply reserve for town water supply cannot be temporarily or permanently licensed for other purposes.</p>
	<p>11.2 Public water supply for town supply is a priority over other uses.</p>
<p>12 Temporary increase to allocation limit in subarea B-L</p>	<p>12.1 The Department of Water will only approve a 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.</p>
	<p>12.2 The temporary increase to the allocation limit will be for a period of 12 months.</p>
	<p>12.3 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.</p>
	<p>12.4 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.</p>
	<p>12.5 Any temporary licences issued may contain conditions requiring a monitoring program including assessment of groundwater-dependent ecosystems stress.</p>

Additional information for groundwater users

Bore water for domestic use

The department does not recommend drinking untreated 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 2010d) 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>.

Chapter five

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.

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 due to the high variability of recharge events. The monitoring program for the Lower Gascoyne plan area was reviewed as part of this planning process and is contained in the *Lower Gascoyne River Monitoring Program (DoW 2011b)*.

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

This assessment helps us to:

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

Chapter six

Implementing and evaluating the plan

This section describes how the department will implement, evaluate and review the *Lower Gascoyne 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 plan area. 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. The Economic Regulatory Authority conducted an inquiry into water resource management and planning charges and delivered its final report on 28 February 2011 (ERA 2011). The outcome of this process is pending a government policy decision and based on this the department may recover either full or partial licensing 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 set triggers for responses that will be necessary when these situations arise (Table 5).

Table 5
Management triggers and response

Event	Trigger	Response
Temporary increase to subarea B-L allocation limit	After 18 months of no river flow or if the department determines low aquifer storage in subarea A prior to this time	The Department of Water may temporarily increase the allowable draw in subarea B-L to 17.5 GL/yr.
Temporary decrease to subarea B-L allocation limit to protect public water supply and in-situ values.	Department of Water and Water Corporation assess there is a risk to public water supply or the Department of Water assesses there is a risk to in-situ values.	The Department of Water may temporarily limit the allowable draw in subarea B-L to 10.7GL/yr. The public water service provider will retain the ability to access 100% of their entitlement and all other licensees will be eligible to access a percentage of their entitlement as directed by the department.

Implementation actions

The department committed to a number of actions to implement this plan (Table 6). We 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 6
Actions for implementing this plan

Action	Responsibility ¹	Timeline	
Resource assessment			
1	Assess the condition and trend of the groundwater resources.	Mid West Gascoyne region, Water Information and Water Resource Assessment	Quarterly
Allocation planning			
2	Review aquifer boundaries and plan area if the department receives an application to install a bore upstream of Rocky Pool, including as part of the Gascoyne Foodbowl Initiative.	Mid West Gascoyne region and Water Allocation Planning and Water Resource Assessment	If required
3	Review subarea boundaries and local licensing rules should additional land be approved for private sale in subarea B-L.	Mid West Gascoyne region and Water Planning	If required
Licence compliance			
4	Undertake meter readings, meter compliance inspections and salinity monitoring for subarea A licence holders.	Mid West Gascoyne region	Monthly
Monitoring			
5	Review, and amend where appropriate, the current groundwater monitoring program.	Water Resource Assessment and Mid West Gascoyne region	Annually
Communication and evaluation statement			
6	Produce and publish an annual evaluation statement on the plan and its implementation.	Mid West Gascoyne region and Water Allocation Planning	Annually

Table 6 (continued)
Actions for implementing this plan

Action	Responsibility ¹	Timeline	
Policy			
7	If a new state-wide policy is released or if a state-wide policy is amended, we will review it to ensure it is appropriate to the Lower Gascoyne plan area. If it is not appropriate, we will update the local licensing rules contained in the plan.	Mid West Gascoyne region and Water Allocation Planning	If required
8	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 7).

Table 7
Actions for future planning

Action	Responsibility	Timeline	
1	Ensure all available information from drilling and hydrological 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	Review the allocation limit decisions 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
6	Review the allocation limits and update the plan if there is a change in recharge event frequency and magnitude resulting from climate change.	Allocation planning	If required
7	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 (including ecological 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 subject to management capacity
8	Investigate trialling the use of water over 176 mS/m EC at 25 °C for horticultural purposes to evaluate management and monitoring implications.	Mid West Gascoyne region	
9	Improve understanding of water requirements of groundwater-dependent ecosystems.	Water Allocation Planning	

6.2 Evaluating and reviewing the plan

Table 8 summarises the performance indicators that we will use to measure the performance of this plan against its objectives.

Table 8
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) To ensure that increased salinity does not cause significant or permanent degradation to the resource.	<ul style="list-style-type: none"> 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) To maintain groundwater levels and water quality sufficient to meet the minimum in situ value water requirements.	<ul style="list-style-type: none"> Number of breaches of environmental requirements in operating strategy for licensees in B-L. Number of reports and complaints regarding decline in condition of river red gums. Review selected hydrographs in subarea A to determine the number of times groundwater levels 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 176 mS/m EC at 25 °C) in older alluvium does not exhibit a downward decline over a period	Objective M1 (subarea A) To maximise the volume of fresh (less than 176 mS/m EC at 25 °C) groundwater available for abstraction in the older alluvium during periods of low aquifer recharge. Objective M6 (subarea B-L) To maximise the volume of fresh (less than 176 mS/m EC at 25 °C) groundwater available for abstraction in the older alluvium during periods of low aquifer recharge.	<ul style="list-style-type: none"> Estimates of depletion percentage in older alluvium aquifer, as given in aquifer status reports.

Table 8 (continued)
Performance indicators to measure the plan's performance

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) To maximise the abstraction of surface water flows.	<ul style="list-style-type: none"> 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) To ensure licensees comply with all licence conditions.	<ul style="list-style-type: none"> 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) To recover licensed entitlements to within the allocation limit.	<ul style="list-style-type: none"> Compare the volume of water licensed against the allocation limit for each resource. Report on the volume of unused water entitlements recouped.
Cases of inefficient water use	Objective M5 (subarea A) To promote water use efficiency.	<ul style="list-style-type: none"> Number of complaints and verified cases of water wastage.
Carnarvon water restrictions	Objective M8 (subarea B-L) To manage abstraction in the area to ensure there is a low risk to the public water supply for Carnarvon.	<ul style="list-style-type: none"> No water restrictions applied to Carnarvon public water supply users.

The department will release an annual evaluation statement that describes how water resources and our water management are tracking against the plan's objectives. The statement includes:

- the allocation status for each resource, including any changes in entitlements since the last year
- the status of actions set out in the plan in the evaluation period
- the status and trends of groundwater storage and water quality
- the department's performance against the plan objectives
- decide if there is a need to amend any component of the plan or replace the plan.

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.

Glossary

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.
Prolongation	A prolongation adjoins a grower's property and is an extension of the property's side boundaries. Generally it extends into the middle of the adjacent river bed.
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 electrical conductivity (EC). The department standard for measurement is millisiemens per meter at 25 degrees Celsius (mS/m at 25°C).
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. They 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 anything 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 anything referred to in paragraph (a), (b) or (c). From the <i>Rights in Water and Irrigation Act 1914</i> .
Water entitlement	The quantity of water that a person is entitled to abstract annually in accordance with the <i>Rights in Water and Irrigation Act 1914</i> 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 <i>Metropolitan Water Supply, Sewerage and Drainage Act 1909</i> or <i>Country Areas Water Supply Act 1947</i> 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 calculated volume of water that can be taken from a system renewably; subject to the effects of climate, variability, water quality and in situ water dependencies.

Volumes of water

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)

List of shortened forms

List of shortened forms	
CWAAC	Carnarvon Water Allocation Advisory Committee
CSIRO	Commonwealth Scientific and Industrial Research Organisation
DoW	Department of Water
EC	Electrical Conductivity
ERA	Economic Regulation Authority
GASFAMS	Gascoyne River Floodplain Aquifers Modelling System
WRC	Water and Rivers Commission

References

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Notes



RECYCLED CONTENT

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