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

Lower Collie surface water allocation plan

Draft for public comment

Looking after all our water needs

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for public comment

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Department of Water

Water resource and allocation planning series

Report no. 47

May 2011

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May 2011

ISSN 1327-8428 (print)

ISSN 1834-2620 (online)

ISBN 978-1-921789-51-9 (print)

ISBN 978-1-921789-52-6 (online)

Acknowledgements

The Department of Water acknowledges the following people for their contribution to this publication: Katherine Bennett, Michael Braccia, Richard Carter, Guy Chandler, John Connolly, Jacqueline Durrant, Christie Harrison, Brendan Kelly, Ian Loh, Clare Mason, Mark Pearcey, Milica Subotic, Bev Thurlow and Susan Worley.

This project was supported with funding assistance from the Australian Government's Water for the Future – Water Smart Australia program.

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Disclaimer

Foreword

The Department of Water has developed the *Lower Collie surface water allocation plan* to deal with the challenges of increasing and diversifying water demand, and reducing rainfall. The plan sets out how we will manage water use in the lower Collie surface water plan area.

For the first time in the state we have used projections of a future climate, produced by the CSIRO, to set allocation limits and to define environmental water provisions in the plan.

The South West has been getting drier since the mid 1970s and the CSIRO projects that rainfall will decrease by another 9% and runoff by a further 25% by 2030. In 2010 inflows into rivers in the lower Collie surface water plan area were the lowest on record.

The majority of surface water that is used in the plan area is supplied by Harvey Water from the Wellington and Harvey reservoirs which are outside of the plan area. Water is delivered via irrigation pipes and channels to more than 300 water shareholders in the plan area.

Harvey Water has managed the Harvey and Collie irrigation districts since they were privatised in 1996 and service horticultural and industrial as well as agricultural customers in the region.

People also obtain water directly from rivers in the plan area. These self-supply users pump water from the stream and store it in off-stream dams, or have on-stream dams which fill in winter. Thirty self-supply users use water commercially in the plan area and about one hundred and thirty use water for stock and domestic purposes.

In addition to their importance for consumptive use, rivers in the plan area are also significant to Nyungar people, support aquatic life like marron and western pygmy perch and provide recreational opportunities.

We encourage you to send us your comments and views on the plan by 29 August 2011. The final version of this plan will be accompanied by a statement of response document which will summarise how we used your comments.

Maree De Lacey

Acting Director General, Department of Water

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Summary

The Department of Water uses water allocation plans to guide the allocation and licensing of water in Western Australia. Our aim is to maximise the economic benefits of water use in the state while maintaining the important ecological, social and cultural values associated with rivers and aquifers.

The need for a plan in the lower Collie area

We have developed the lower Collie allocation plan to:

- define how much water should be made available for abstraction now, considering that the future climate is likely to be drier
- manage the impact of water abstraction on ecological and social values in the plan area
- manage the impact of allocations from the Wellington and Worsley Alumina reservoirs on downstream values in the lower Collie and Augustus rivers
- detail the licensing policies that are used by water licensing officers to set licence conditions to guide how water use and its effects are managed, metered and reported on in the plan area.

Water availability

Additional water is available for licensing in 16 out of the 24 allocation units (called resources) in the plan area, and the remaining resources are now fully-allocated.

At 1 February 2011, 5633 ML was available for licensing. This includes 502 ML in the lower Collie subarea, 958 ML in the Brunswick subarea and 4173 ML in the Wellesley subarea (refer to Section 1.3 for an explanation of a surface water subarea and a surface water resource) (See Table 2).

Additional surface water developments in fully-allocated areas may be accommodated through water-use efficiency measures and/or trading where feasible.

Allocation and licensing approach

We manage abstraction from surface water resources in the plan area through our licensing program. This allocation plan will direct licensing decisions. It is the first to be developed for surface water resources for the plan area.

Our licensing officers will license to the allocation limits in each of the 24 resources using the licensing policies outlined in Section 4 of this plan.

Finalising the plan using the public submissions

The department will consider your comments on the *Lower Collie surface water allocation plan* before it is finalised.

We will produce a statement of response that summarises your comments and our responses to them, and it 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 by 5.00 pm, 29th August 2011 to:

allocation.planning@water.wa.gov.au

or the address below:

Clare Mason

Water Allocation Planning

Department of Water

PO Box K822

Perth Western Australia 6842

1 Introduction

The Department of Water has developed the *Lower Collie surface water allocation plan* to specify how surface water resources will be managed, and to show how water licensing decisions will be made in the lower Collie plan area.

This plan is accompanied by the *Lower Collie surface water allocation plan methods report* (DoW 2011), which explains our approach and the data used to make allocation decisions.

1.1 Scope of the plan

The *Lower Collie surface water allocation plan* sets out the:

- boundaries of the 24 surface water resources in the plan area (in this report we use the term 'resource' to describe small catchments that contain a watercourse – it is the spatial unit used to set an allocation limit)
- total amount of surface water available for allocation in each resource and whether water is available for new use
- objectives developed for each resource
- state and local policies which guide how water is licensed and allocated in the plan area
- way we will implement, evaluate and review the plan.

This plan does not:

- apply to water abstraction from spring fed dams, soaks or drains
- address the protection of drinking water sources, flooding, drainage or land planning issues as these are addressed through other plans[i]
- address water quality management, as this is dealt with as part of the *Leschenault Water Quality Improvement Plan* (DoW 2011b in preparation)
- outline the allocation and licensing approach associated with groundwater, as this is addressed in the *South West groundwater areas allocation plan* (DoW 2009a).

When and for how long will this plan apply?

The *Lower Collie surface water allocation plan* will come into effect from the day that the Minister for Water endorses the final plan. The plan is scheduled to be reviewed and replaced after 2020 or earlier if the annual evaluation process recommends it.

[i] To obtain a copy of one of the plans, contact the Bunbury regional office or look on the Department of Water website, select South West region under 'Water regions'.

1.2 Plan area

This plan covers the lower Collie river catchment and tributaries and the Brunswick and Wellesley River subareas (Figure 2).The watercourses in the plan area include the Brunswick, Wellesley, lower Collie, Augustus and Lunenburg rivers, the Henty and Flaherty brooks and Millers Creek and numerous small tributaries. These watercourses flow into the Collie River, which then flow into the Leschenault Estuary.

Surface water that is used in the plan area comes from:

- rivers, either stored in on-stream or off-stream dams, or by direct pumping (self-supply use)
- the Harvey Water irrigation supply channels, which deliver water from the:
  - Wellington Reservoir to the Collie Irrigation District
  - Harvey Reservoir to the Harvey Irrigation District.

Proclamation

Most of the plan area is proclaimed under the *Rights in Water and Irrigation Act 1914*, either as part of an irrigation district or as part of the Brunswick River and tributaries proclamation area.

The plan area contains the proclaimed Collie River irrigation district and the southern part of the proclaimed Harvey irrigation district (Figure 1).

A licence is not required to take water in unproclaimed areas under the current legislation. The plan accounts for water use in the entire plan area and will guide licensing decisions in previously unproclaimed areas or if the legislation is changed.

We anticipate that new legislation will enable licensing in all areas of the state unless covered by an exemption.

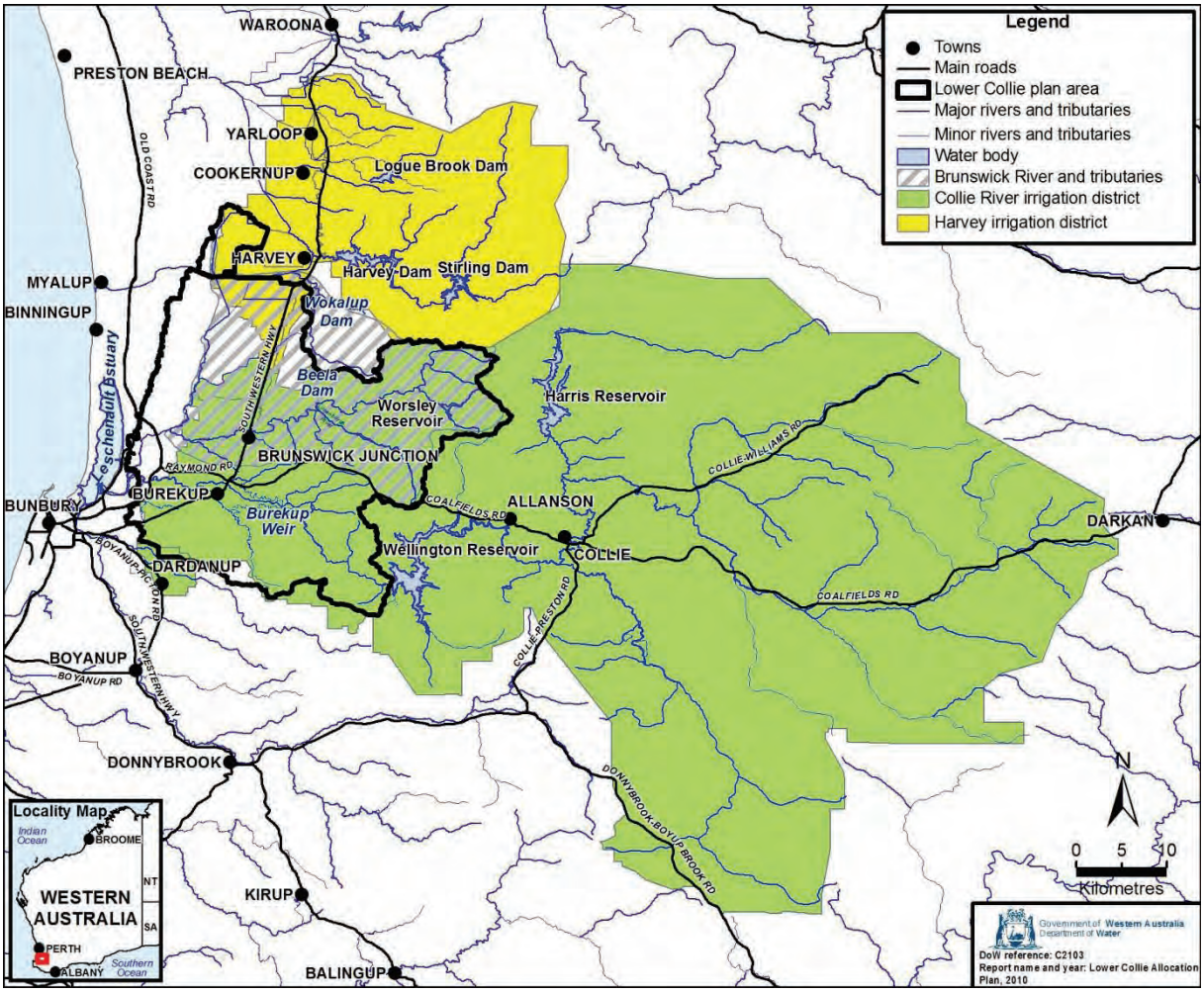

Figure 1 The lower Collie surface water allocation plan areas: proclaimed surface water areas

1.3 Water resources covered by this plan

The plan area has been divided into 24 resource units (called resources) across the three subareas (Figure 2 and Table 1). There are:

- 11 resources in the Brunswick River subarea
- 10 resources in the lower Collie River and tributaries subarea
- three resources in the Wellesley River subarea.

We have set an allocation limit for each resource (Section 3). The allocation limits apply to all water that flows over, or is held in watercourses in these resources.

This includes water in the Augustus and Brunswick rivers that is released from the Worsley reservoir and water in the lower Collie River that is released from the Wellington Reservoir.

The releases also affect the volume and quality of streamflow in the Wellesley River via irrigation return flows.

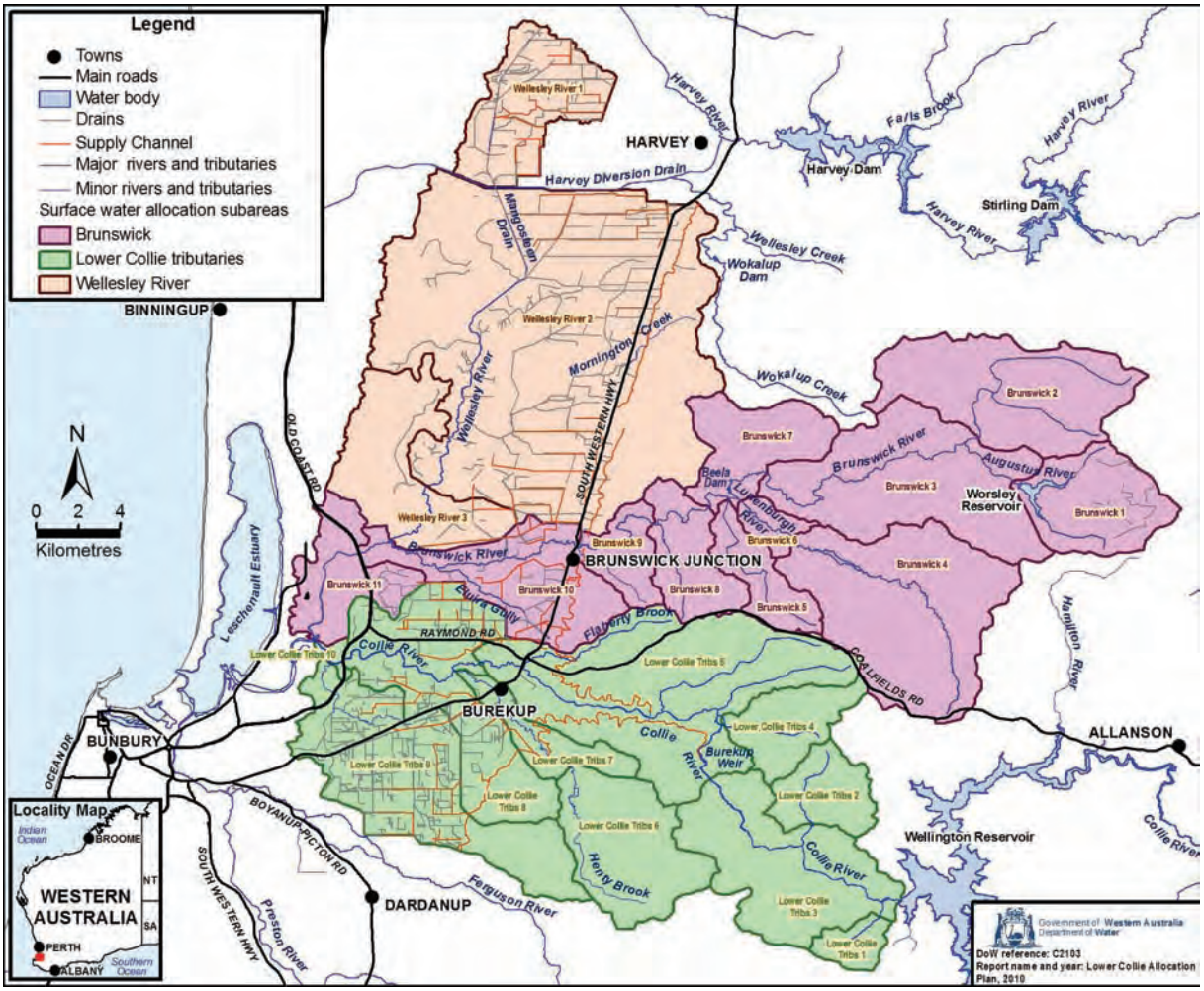

Figure 2 Surface water resources in the lower Collie surface water plan area

Table 1 Lower Collie surface water allocation area by subarea and resource

Surface water allocation subarea	Surface water resource
Brunswick	Brunswick 1
	Brunswick 2
	Brunswick 3
	Brunswick 4
	Brunswick 5
	Brunswick 6
	Brunswick 7
	Brunswick 8
	Brunswick 9
	Brunswick 10
	Brunswick 11
Wellesley River	Wellesley 1
	Wellesley 2
	Wellesley 3
Lower Collie and tributaries	Lower Collie tributaries 1
	Lower Collie tributaries 2
	Lower Collie tributaries 3
	Lower Collie tributaries 4
	Lower Collie tributaries 5
	Lower Collie tributaries 6
	Lower Collie tributaries 7
	Lower Collie tributaries 8
	Lower Collie tributaries 9
	Lower Collie tributaries 10

2 What we want this plan to achieve

Our aim is to supply water for economic benefit in the state while maintaining the important ecological, social and cultural values associated with a resource.

The Department of Water achieves this aim by promoting efficient water use that appropriately values water and through management that is guided by clear objectives.

Using the results of community consultation and scientific investigation we have developed water resource objectives and water management objectives for each resource in the lower Collie surface water allocation plan area. The objectives have been used to guide allocation and licensing decisions for the plan.

2.1 Objectives

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 what we want our management to achieve and what we need to do to achieve the resource objective. They will usually relate to the application of an allocation limit, how water is used and the rules of taking water to avoid ecological and/or social harm.

In resources in the lower Collie plan area where consumptive water use is the priority our aim is to maximise the amount of water available, to maintain the *minimum* ecological and social values, and to define take rules that balance water use and the risks of that water use.

In resources with higher environmental and social values we are protecting more of the flow regime to maintain values within and downstream of the resource.

Water resource objectives for the lower Collie plan area:

a. Maintain a flow regime that reflects catchment rainfall and runoff in the Brunswick 1, 2, 3 and 4 and lower Collie tributaries 1, 2 and 4 resources to maintain ecological values within the resources and to protect the flow that these resources contribute to downstream areas

b. Maintain a flow regime that supplies authorised use in most years and meets 'key'[ii] ecological and social requirements in lower Collie tributaries 3 and 5 (upstream of Burekup weir) and the Brunswick 5, 6, 7, 8, 9, 10 and 11 resources

c. Maintain a flow regime that supplies existing authorised use most of the time and meets the 'minimum'[ii] ecological and social requirements in the lower Collie tributaries 5 (downstream of Burekup Weir), 6, 7, 8, 9 and 10 resources.

[ii] The *Lower Collie surface water allocation plan methods report* (DoW 2011) defines the 'key' and 'minimum' ecological objectives for the lower Collie and Brunswick rivers.

Water management objectives for the lower Collie plan area:

d. Make as much water available as possible for consumptive use within the limits of the resource objectives (All resources)

e. Release water from the Worsley Reservoir in a way that meets downstream ecological, social and Indigenous cultural requirements (Brunswick 1, 3)

f. Release water from the Wellington Reservoir in a way that meets downstream ecological and social downstream requirements (lower Collie tributaries 3,5,8 and 10)

g. Promote water-use efficiency to improve water quality in the Wellesley River (Wellesley 1, 2 and 3).

2.2 How we will meet the objectives of the plan

To meet the objectives of this plan we will:

- license to the allocation limits for each of the 24 surface water resources in the plan area (Section 3.1)
- issue licences according to the allocation and licensing policies detailed in this plan (Section 4)
- design release rules for the Wellington Reservoir and Worsley Reservoir using the environmental water provisions set by the plan. The release rules will be designed to provide the maximum amount of water for irrigation and industrial use while meeting the ecological and social requirements (Section 5)
- coordinate the monitoring of flow, water quality, and ecological parameters and feed this information back into decision making and operation (Section 6)
- carry out the actions to implement the plan (Section 6)
- evaluate whether the plan objectives are being met, and adjust our management response accordingly (Section 7).

3 Allocation limits

Allocation limits are the annual volume of water set aside for consumptive use from a water resource. This includes water available for licensing and water for uses exempt from licensing and takes both science and the needs of users in the catchment into account.

The Department of Water has set allocation limits for each of the 24 resources in the lower Collie surface water allocation plan area using the objectives in Section 2 as a guide.

The allocation limits have been set using streamflow projections based on a median future climate scenario centred on 2020 (DoW 2011). This is to make as much water available for consumptive use as regularly as possible in a drier, warmer future.

The median future climate scenario is not a prediction of the climate over the next ten years, or a forecast of the climate at 2020. It is a scenario of observed data scaled by projected global temperature change between 1990 and 2020. For convenience, the statistics for this period are referred to as being ‘centred on 2020’.

Licence applicants are encouraged to contact the Bunbury regional office for up-to-date water availability information and to discuss opportunities for obtaining water by trading or from alternative sources.

For details of the method and information we used to set allocation limits refer to the *Lower Collie surface water allocation plan methods report* (DoW 2011).

3.1 Components of the allocation limit

Allocation limits for the lower Collie surface water plan area have two components:

- licensable (which includes water that is currently licensed and water that is available for licensing)
- unlicensable.

There are no licensed public water supply abstractions or water reserved for future public water supply in the lower Collie plan area.

To define the amount of licensable water in lower Collie we first accounted for water use exempt from licensing (unlicensable). Unlicensable water use includes water that is taken:

- for riparian rights or stock and domestic use only (e.g. water for household purposes and non-intensive stock watering)
- from springs and wetlands wholly within a property
- from streams arising on a property
- in areas not proclaimed

Under the *Rights in Water and Irrigation Act 1914* the Department of Water cannot licence these types of water use. However, we do need to estimate them to make accurate allocation decisions and to define the amount of water available for licensing. Table 2 shows the allocation limit components and totals that we are adopting for the lower Collie plan area.

Table 2 Components of the allocation limit in the lower Collie plan area

Resource	Allocation limit ML/yr	Allocation limit components ML/yr		Is water available? (as at February 2011)*
		Licensable	Unlicensed use	
Lower Collie tribs 1	0	0	0	No
Lower Collie tribs 2	0	0	0	No
Lower Collie tribs 3	4	0	4	No
Lower Collie tribs 4	43	0	43	No
Lower Collie tribs 5	169	47	122	Limited
Lower Collie tribs 6	741	636	105	Limited
Lower Collie tribs 7	374	340	34	No
Lower Collie tribs 8	47	12	35	Limited
Lower Collie tribs 9	493	400	93	Yes
Lower Collie tribs 10	10	0	10	No
Total	**1881**	**1435**	**446**	
Brunswick 1	2600	2600	0	No
Brunswick 2	201	187	14	Yes
Brunswick 3	28	0	28	No
Brunswick 4	97	53	44	Yes
Brunswick 5	317	280	37	Yes
Brunswick 6	74	50	24	Yes
Brunswick 7	218	166	52	Yes
Brunswick 8	247	206	41	Yes
Brunswick 9	120	90	30	Yes
Brunswick 10	142	40	102	Limited
Brunswick 11	40	10	30	Limited
Total	**4084**	**3682**	**402**	
Wellesley 1	601	578	23	Yes
Wellesley 2	3638	3566	72	Yes
Wellesley 3	41	29	12	Yes
Total	**4280**	**4173**	**107**	
Total for plan area	**10245**	**9290**	**955**	

**Available water is considered to be limited if estimated current use is greater than 70% of the allocation limit. No water available means that use has reached the allocation limit.*

Details of how we estimated unlicensed use and the other components of the allocation limits are given in the *Lower Collie surface water allocation plan methods report* (DoW 2011).

4 Water allocation and licensing policies

Water licences are the regulatory instrument the Department of Water uses under the *Rights in Water and Irrigation Act 1914* to manage the individual take of groundwater and surface water.

Where water users legally require a licence, the department uses relevant policies to assess licence applications and to set conditions for the take of water.

This allocation plan describes how we address licensing and water allocation issues in the lower Collie surface water plan area. It provides direction on the licence assessment process, and the additional licensing policies that may be used to manage local issues.

4.1 General approach to allocating water

The objectives set out in Section 2.1 provide the department's approach to allocating water in the lower Collie plan area. The department uses the licensing process to manage the available water up to the allocation limits set in Section 3.

Allocating water in fully-allocated or over-allocated resources

The department applies the 'first-in first-served' approach to assess applications for water licences. Where the level of allocation in a resource approaches the allocation limit (generally where more than 70% of a resource has been allocated) the department may consider alternative mechanisms to the first-in first-served approach.

Allocating water in low flow (summer) periods

We encourage existing self-supply users to reduce their take during periods of low flow by being more efficient and/or by seeking alternative water sources or storage solutions. If water storage is an option, we support pumping from a watercourse into off-stream storage during high flow periods rather than using on-stream dams.

Low flow periods are considered to be from 16 October to 14 June. This is the period outside the winter fill period which is defined in the sustainable diversions limit project – a project which has defined yield estimates for areas from Geraldton to Esperance in Western Australia. Refer to the *Lower Collie surface water allocation methods report* (DoW 2011) for more detail.

4.2 Legislative requirements

Rights in Water and Irrigation Act 1914

The *Rights in Water and Irrigation Act 1914* (*the Act*) establishes the legislative framework for managing and allocating water resources in Western Australia. Water

users in the plan area may require a water licence to lawfully take surface water under section 5C of *the Act*.

The granting of a water licence is at the department's discretion. The allocation plan guides our assessment under clause 7 (2) of Schedule 1 of *the Act,* in exercising this discretion.

A permit is also required to interfere with the bed and banks of watercourses, including the installation of pumps or construction of dams, under clauses 11, 17 and 21 of *the Act*.

In granting a licence, clause 15 of Schedule 1 of *the Act* enables the department to include terms, conditions and restrictions on licences. Conditions may refer to attachments or other documents that the licensee must abide by (e.g. an operating strategy).

Clause 24 (1) of Schedule 1 in *the Act* 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.

The department has developed the policies in Section 4.4 to provide further detail and direction associated with licence conditions.

Riparian rights

Riparian rights are detailed in Part III, Division 1B, sections 9 and 20 of the *Rights in Water and Irrigation Act 1914*. A riparian right grants a landholder the right to take surface water for domestic or stock water that is non-commercial:

- In a proclaimed area:
  - where a watercourse flows across their private property
  - where a watercourse flows through crown land (but not unallocated crown land) (Section 10 of *the Act* applies).
- In an unproclaimed area, a riparian right grants a landholder the right:
  - in addition to the points above, for any other purpose to the extent that the flow of water in the watercourse or the amount of water in the wetland is not sensibly diminished
  - where a watercourse flows through crown land (but not unallocated crown land) (Section 21 applies).

4.3 Licensing approach

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

- support development

- protect the entitlements of other users
- protect water-dependent ecosystems.

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

- the *Rights in Water and Irrigation Act 1914*
- state-wide strategic and operational policies
- this plan.

Auditing licensed take

The department carries out licence compliance audits to ensure that take and use of water is in accordance with the entitlement and conditions of the licence. We review monitoring and metering data as part of auditing and assesses whether there are any local effects. Where non-compliance or unauthorised use is identified the department will undertake appropriate enforcement.

Water-use efficiency

The department encourages surface water users to implement water-use efficiency measures. The licensing policies given in Section 4.4 aim to do this, particularly those regarding:

- trading, transferring or leasing water
- implementing water-use efficiency measures that are included in operating strategies.

Trading (water entitlement transactions)

Trading is possible in the lower Collie surface water allocation plan area. We will consider applications to trade with guidance from *Operational policy 5.13 Water entitlement transactions for Western Australia* (DoW 2009b) and in accordance with Division 7 of the *Rights in Water and Irrigation Act 1914.*

Trading would normally need to occur within the same surface water resource, or between resources that are connected, where it can be demonstrated that there will be no adverse effects on other users or the environment as a result of the trade.

Land planning changes and subdivisions

Under the *Rights in Water and Irrigation Act 1914* a water licence is not automatically split or transferred between properties when land is subdivided. Landholders should contact the department at least a month before the sale or transfer of land to find out the best way to transfer water entitlements.

Land access requirements

Applicants who want to build a dam need to have access to all of the land that will be inundated by that dam. If the water stored by the proposed dam covers part of a neighbouring freehold property, applicants will need to:

- amalgamate all land inundated by the dam under a single certificate of title
- obtain an easement on the flooded portion of the neighbouring land
- enter into a 'deed of agreement' with the neighbouring owner of the property by lodging a 'subject to claim' caveat on the adjoining land title.

If the stored water covers public land, applicants will need to purchase or exchange the affected public land from the vesting agent or lease the affected public land from the vesting agent.

Managing the effects of water use

The department requires licensees to manage the effects of their water use on the quality of water in watercourses in the lower Collie plan area. This is so there is no net adverse effect on other users, the watercourses in the plan area or the Leschenault Estuary.

The department may require the licensee to develop an operating strategy (*Operational policy 5.08)* (Table 3) which describes how water quality parameters will be monitored and reported as part of the licence, and how the effects can be managed.

4.4 Licensing policies

Policies that apply state-wide

The department develops strategic and operational policies that apply across the state.

Table 3 outlines the main strategic and operational policies that apply in the lower Collie surface water plan area.

Table 3 Strategic and operation policies that apply in the lower Collie plan area

Policy title	What the policy describes
Statewide policy no. 11 – Management of unused licensed water entitlements (WRC 2003)	The circumstances when whole or portions of a licensed entitlement may be recouped by the department to maximise development opportunities, including: • if it is proved that the entitlements are consistently unused • extenuating circumstances cannot be provided.
Operational policy no 5.10 - Managing breaches of the Rights in Water and Irrigation Act, 1914, on watercourses in Western Australia (DoW 2011)	How the department deals with complaints and disputes between neighbours along the same stream or watercourse.
Operational policy no. 5.13 – Water entitlement transactions for Western Australia (DoW 2009b)	The rules for a trade, transfer or lease of all, or part of a licensed water entitlement.
Strategic policy 5.03 – Metering the taking of water (DoW 2009c) *Guidelines for water meter installation* (DoW 2009d) *Rights in Water and Irrigation (Approved Meters) Order 2009*	The department's position on metering the take of water and the circumstances where metering conditions may be imposed on individual licences.
Operational policy no. 5.11 – Timely submission of required further information (DoW 2009e)	The department's approach to managing timelines when a licensee is requested to submit additional information as part of their licence application.
Operational policy no. 5.08 – Use of operating strategies in the water licensing process (DoW 2010b)	Guidance on when an operating strategy is required and what it should contain, including: • the water licence applicants who are likely to require an operating strategy • 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.
Operational Policy 5.05 – giving an undertaking to grant a water licence or permit (DoW 2010c)	The circumstances under which the department will give undertakings for: • granting a licence to take water • approval of agreements with respect to water entitlements • permits to interfere with a watercourse.

Policy title	What the policy describes
Operational policy no 1.2 – Policy on water conservation/efficiency plans: achieving water use efficiency gains through water licensing (DoW 2010d)	Direction on preparing water conservation and efficiency plans required by water users as part of the water licensing process.
Statewide policy no. 5 – Environmental water provisions policy (WRC 2000)	Guidance on how the department provides water for environmental flows and the passage of aquatic life in surface and groundwater resources in the state.

Local licensing policies for the lower Collie plan area

Local policies developed for the lower Collie surface water plan area are listed in Table 4.

Local policies complement the department's state-wide strategic or operational policies but take precedence over state-wide policies. They are local rules that help to interpret the state-wide policy in a given area, and which provide additional guidance for licensing officers where required.

Table 4 Local licensing policies which relate to the lower Collie surface water allocation plan area

Policy group	Policy detail
1. Water licensing and use	
	1.1 All new surface water licences may be subject to a condition requiring the installation and maintenance of a department approved flowmeter to measure water use. The frequency of meter readings and reporting requirements will be stated in the licence conditions.
	1.2 The department may require applications to construct a new dam to include professionally surveyed characteristics (level, area, volume) so that the storage capacity of the dam can be determined.
	1.3 New on-stream dams are required to have a low-flow bypass system.
2 Stock and domestic water use	
	2.1 The use of water from on-stream dams for non-intensive or non-commercial (stock and domestic) purposes is exempt from licensing. The construction of dams for stock and domestic purposes still require a permit to interfere with bed and banks.
3 Water level and flow criteria	
	3.2 If water is flowing into an on-stream farm dam, then some water should be left to flow out downstream.

4.5 Factors that may affect future licensing

The department has identified three factors that have the potential to have a major impact on the storage, distribution and/or volume of water in the lower Collie surface water plan area in the future. These are the:

- Collie River Irrigation System Planning Project
- possible changes to historical releases from Burekup Weir into the Henty Brook and Brunswick River
- proposals to dam the Brunswick River.

The department has developed a position on each of these possibilities, to guide future allocation and licensing decisions in the lower Collie plan area.

Collie River Irrigation System Planning Project

Harvey Water began investigating options for replacing open channels with pipes in the Collie irrigation system in 2007, and has submitted an application to the federal government for part funding of the project.

The Department of Water is supportive of the project as long as part of the water savings resulting from the project is used for environmental flows.

The department generally supports measures to improve irrigation efficiency – this is consistent with our licensing approach and our state-wide Operational policy 1.2.

Releases into the Henty Brook and the Brunswick River

Harvey Water has diverted an average of 1.8 GL/yr since 2003–04 from the Burekup Weir to the Henty Brook and the Brunswick River. The releases are made for social amenity for the Brunswick picnic spot as well as for social amenity and stock and domestic purposes along part of the Henty Brook.

The department will investigate the ecological and social water requirements of the Henty Brook and the Brunswick River picnic spot and will decide whether future releases should be altered or should cease. This is particularly important given increasing water scarcity and the likelihood of a drier, warmer future. The department will work closely with Harvey Water to manage releases for social amenity and domestic purposes as part of their operating strategy.

Proposals to dam the Brunswick River

The department does not support the construction of a dam on the Brunswick River.

This is consistent with the Department of Water's South West regional water plan which states that:

'In the South West many river systems are already dammed. As pressure increases for 'new' water sources, there could be pressure to build further large scale dams on

additional watercourses. Any further large scale damming of the South West's water systems would be detrimental to community and environmental values and generally not supported by the department as other water sources may be more affordable and appropriate.' (DoW 2010a, p. 19).

5 Management of releases

The department sets allocation limits and uses management rules to complement them. We do this to maximise the amount of water available for use and to manage risks to social and environmental values.

Management rules for self-supply abstraction are set in this plan as state and local licensing policies. The policies guide how water is stored and taken in the lower Collie surface water plan area and are outlined in Section 4.4.

Management rules for the Wellington and Worsley reservoirs are set in this plan as:

- an environmental water provision to guide how water is stored and released from the Wellington Reservoir into the lower Collie River
- an environmental water provision to guide how water is stored and released from the Worsley Reservoir into the Augustus River
- rules for how water is taken from the Wellington Reservoir.

The environmental water provisions and take rules have been designed to maximise the amount of time that full entitlements for irrigation and industry are available and to maintain values downstream of the reservoirs, especially in dry years.

5.1 Management of Wellington Reservoir

Demand for water from the Wellington Reservoir is increasing – including possible requirements for cooling water for power generation and to meet new industrial demands. This increased demand coincides with decreasing annual inflows to the reservoir.

Annual inflow to the reservoir between 1975 and 1999 was 129 GL, this reduced to 103 GL between 1999 and 2009 and is projected to reduce to 90.7 GL under a median future climate projection centred on 2030 (DoW 2011a in preparation).

To maximise the amount of water available for consumptive use from the Wellington Reservoir in a drier future, the:

- volume of water released from the reservoir over winter will be reduced
- take of water from the reservoir will be restricted when dam storage levels fall below 115 GL

This will have implications for the reliability of entitlements from the reservoir and for downstream environmental and social values in the lower Collie plan area.

Summer environmental water provision

Lower Collie River from Wellington reservoir to the Burekup weir

Summer flow in the lower Collie River, is mostly derived from irrigation releases from the Wellington Reservoir. An average of 0.25 GL/day was released from the reservoir for irrigation between October and April from 1975 to 2007.

The releases maintain a range of environmental and social values in the lower Collie River, upstream of Burekup weir, and are well in excess of the 0.0025 GL/day flow needed to maintain ecological and social values over summer.

Lower Collie River from Burekup weir downstream

The water released from the Wellington reservoir over summer is diverted downstream of the Burekup weir into Harvey Waters irrigation supply channel.

Water also spills over the Burekup weir into the lower Collie River because of difficulties in matching releases from Wellington Reservoir with diversion demands at Burekup Weir. We estimate that approximately 3GL spilled over the Burekup weir into the lower Collie River from October to April between 1975 and 2007.

Work undertaken as part of the Shenton's Elbow environmental flow study confirms that spills over the Burekup weir met the downstream environmental requirements in the lower Collie River between 1997 and 2009 (Bennett & Green 2011).

We need to:

- define the amount of water required over summer to maintain environmental values downstream of the Burekup weir (e.g. equal or less than 3GL)
- measure spills over Burekup weir into the lower Collie River.

The environmental water provision for downstream of the Burekup weir will be defined and included in the final version of the lower Collie surface water allocation plan (Refer Action 4, Table 6).

This will secure the environmental water provision, and water for self-suppliers on the lower Collie River downstream of the Burekup weir, regardless of how the pattern of water supply from Wellington reservoir, or the operation of the Burekup weir, may change in the future.

We will also work with licensees to measure spills over the Burekup weir. This will enable us to:

- define the volume of spills that could be used for consumptive use if the weir were to be upgraded
- check that the spills over the weir meet the environmental water provision.

Winter environmental water provision

Lower Collie River from Wellington Reservoir to the Burekup weir

Winter flow in the lower Collie River is made up of releases from the bottom of the Wellington Reservoir for salinity management (called scour releases), spillage over Wellington Dam and inflows from the intervening catchment. The volume of water released for scour and catchment inflow averaged 0.322 GL/day between 1976 and 2010.

To meet the increased industrial demand for water from the reservoir - required in summer and in winter - in a drier future, the winter releases from the reservoir must reduce.

To maintain the environmental and social values associated with winter flow – consistent with objectives (b), (c), and (f) of this plan, the department has set a winter environmental water provision to be released from the Wellington Reservoir from May to September.

The provision will replace the existing winter scour releases when the operating strategy for the Wellington Reservoir is updated in 2011. It consists of a:

- fixed minimum component for river function (2.1 GL/winter)
- variable component – dependent on the volume stored in the Wellington Reservoir.

The fixed minimum component is based on maintaining water quality in pools downstream of the reservoir and maintaining some riffle inundation for macroinvertebrates which provide food for native fish.

The variable component provides additional winter flow where possible. In years where dam storage levels are high it provides more water for fish spawning and migration and for inundation of fringing vegetation. In years when dam storage levels are low, the variable component of the environmental water provision is less so that water is available for consumptive use.

Lower Collie River from Burekup weir to the mouth

As little water is diverted at Burekup weir outside the irrigation season, water has regularly spilled over Burekup weir into the lower Collie River during winter. These spills consist of Wellington Reservoir releases and spills, and runoff from the intervening catchment (see above). Wellington Dam spills tend to occur late in the winter, and not at all in dry winters. Hence scour releases from Wellington Reservoir are a major component of Burekup weir spills, and contribute significantly to the lower Collie River, especially in dry years.

In future the scour releases will be replaced by the Wellington Reservoir winter environmental water provision (outlined above).

We anticipate that these releases will still spill over the Burekup weir, and that the volume and timing of spills will be sufficient to maintain downstream environmental values in the lower Collie River. This assumption will be confirmed and included in the final lower Collie surface water allocation plan.

Take rules

To manage how water is shared between the different demands from the Wellington Reservoir in drier years, the department has specified the storage levels when restrictions to irrigation and industrial entitlements will be triggered (Figure 3) (DoW 2011a in preparation).

The department will announce the level of restrictions to apply to entitlements, dependent on the reservoir, for the current year, by October 30 each year.

The annual irrigation and industrial draws from Wellington Reservoir are based on the volume of water stored in Wellington Reservoir on 1 October of each year.

Effectively, when the storage is greater than 115 GL on 1 October 100% of irrigation and industry entitlements will be available. However, as the storage level on 1 October reduces below 115 GL the level of restrictions increase, at a linear rate, until 0% of entitlements are available when the volume stored on 1 October reaches 25 GL (DoW 2011a in preparation)

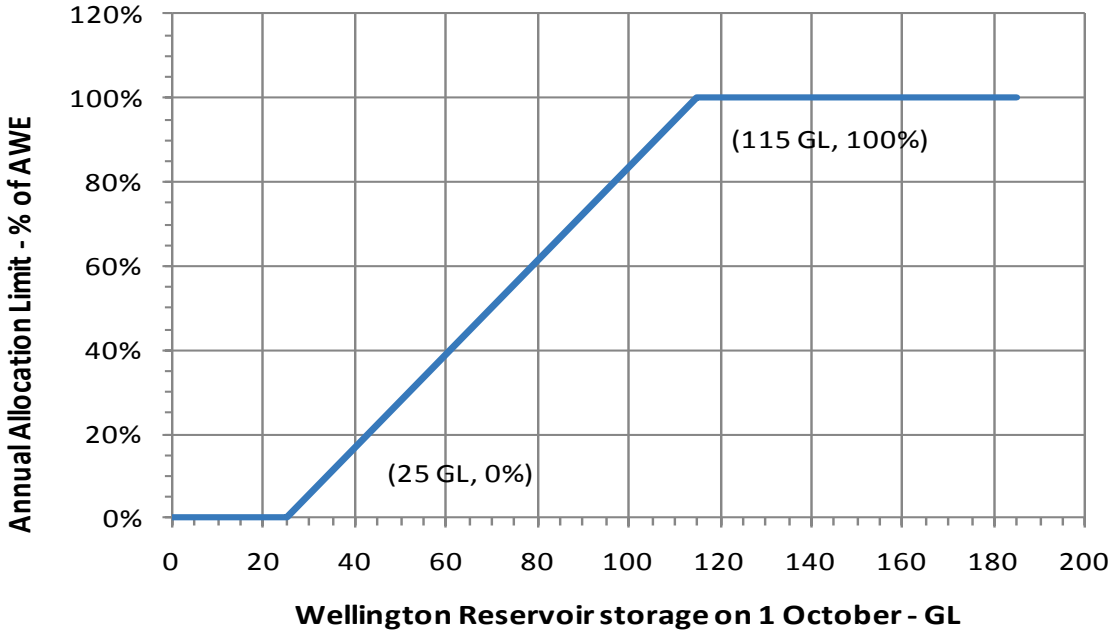

Figure 3 Restriction policy for irrigation and industrial draws from Wellington Reservoir (DoW 2011a in preparation)

How often will there be restrictions on entitlements?

The Department of Water has undertaken modelling of the Wellington Reservoir to examine the effect of the new industrial water demands on both irrigation and industrial entitlements (DoW 2011a in preparation).

It is likely that the new industrial and irrigation demands from the reservoir will not be able to be met in all years – under either a past or future climate. The Wellington reservoir water balance simulations (DoW 2011a in preparation) project that entitlements are likely to be restricted:

- 75% of the time if inflows to the reservoir in the future are similar to inflows to the reservoir between 1975 and 2003
- 53% of the time if inflows to the reservoir in future are similar to the projected inflows to the reservoir under a median future climate at 2030.

The future power station cooling water demand (5.1 GL/yr), and the fixed component of the environmental water provision (2.1 GL/yr) will not be restricted as these demands are required to have a 100% annual reliability (DoW 2011a in preparation).

The average volume of the variable component of the environmental water provision over a year is projected to be between:

- 3.9GL and 18.3GL if the future climate is similar to the past
- 2.2GL and 11 GL if the future climate reflects the CSIROs median future climate projection at 2030.

The number of years when there is likely to be a shortfall in industrial supply, and the maximum, median and mean annual volumes of shortfalls, are summarised for each scenario in the *Wellington Reservoir water balance simulations, a summary of the TwoRes modelling scenarios* (DoW 2011a in preparation).

Why haven't there been restrictions to entitlements in the past?

In the past total use from the reservoir has been low compared to the inflow – the only demand from the reservoir has been for irrigation, and frequent spills have occurred when the water level in the reservoir exceeded the full supply level.

Between 1976 and 2010, the 68.0 GL annual irrigation entitlement from Wellington Reservoir – of which 61.2GL was available for diversion at the Burekup Weir – could have been provided for every year.

However, with the exception of the unusually long irrigation season and high irrigation diversion of 56.7 GL at Burekup Weir in 2000–01, the maximum volume of water diverted at Burekup was 50.7 GL in the 1998–99 seasons (DoW 2011a in preparation).

5.2 Management of the Worsley Reservoir

The Worsley Reservoir is located on the headwaters of the Augustus River in the far eastern part of the lower Collie surface water allocation plan area (Figure 2).

The Department of Water and Worsley Alumina Pty Ltd are currently revising the release regime from the Worsley Reservoir to reflect flow regimes more typical in the area, consistent with objectives (a) and (e) of this allocation plan.

In the past there would have been periods of no flow during summer on the Augustus River, similar to the nearby Hamilton River. The dam has also delayed the onset of early winter flows in the Augustus River and reduced the magnitude of flows.

Since 1996 a condition on the Worsley water licence has required a release at (35 m^3/hour) from 1 Dec to 28 Feb for the purposes of maintaining downstream ecological values. Outside this period there is no requirement to release water. This release regime provides a permanent summer flow from December to the end of February downstream of the dam.

The current practice of releasing a constant volume of water in summer regardless of local conditions maintains an artificial summer flow regime and reduces the amount of water available for Worsley Alumina in dry years.

Environmental water provision

We want to change the current releases so they more closely mimic patterns of rainfall and runoff in the catchment. We anticipate that this will:

- increase ecological resilience to low flows in summer in a drying climate
- maximise the amount of time that Worsley Alumina Pty Ltd will have access to their full entitlement.

The department is working with Worsley Alumina Pty Ltd to alter the summer release regime from the reservoir. We are changing the current regime so that it mimics flow in the Hamilton River.

The summer releases will be stepped down over three summers from 2013 to 2015. The summer regime will move from one that is maintained independent of local conditions to one that has some periods of cease to flow in summer until it mimics a summer flow regime similar to the Hamilton River.

Winter releases that more closely mimic the Augustus River, particularly in the early winter period, also need to be introduced. The release rules and desired flow regime below the dam will be established in consultation with Worsley Alumina Pty Ltd in late 2012.

6 Monitoring program for the plan area

The department will review data annually from selected streamflow gauging stations in the plan area to evaluate whether we are meeting the objectives of the plan. This assessment will also help us to review allocation limits and licence conditions.

6.1 Current hydrological monitoring

Hydrological monitoring

As part of the department's state reference network 20 streamflow gauging stations have operated on rivers in the plan area periodically since 1939. Gauging stations are also operated by Water Corporation and Worsley Alumina Pty Ltd in the plan area.

6.2 Monitoring program for the plan

We will use data from several streamflow gauges to inform evaluation of the lower Collie plan. The gauges which link to the existing minimum flow thresholds and hydrological monitoring include:

- Brunswick River, Cross Farm (612032)
- Collie River, Rose Road (612043)
- Augustus River, operated by Worsley Alumina Pty Ltd (612024)
- Collie River, Wellington Flume, operated by the Water Corporation (612013).

The location of the gauging stations is shown in Figure 4.

The annual review will assess the response of runoff to rainfall against historical runoff and future runoff scenarios at each streamflow gauge and will also identify changes in the frequency and magnitude of streamflow against the minimum flow thresholds (Table 5).

The minimum flow thresholds in Table 5 were developed as part of environmental flow studies completed in the lower Collie plan area.

The summer flow threshold is predicted to maintain dissolved oxygen above thresholds known to cause stress in fish and other aquatic biota. The winter flow threshold is predicted to maintain habitat for aquatic macroinvertebrates.

Table 5 Minimum flow thresholds

Environmental flow study sites	Minimum flow threshold ML/day	Streamflow monitoring gauge
Brunswick 1	1.7	Brunswick River, Cross Farm (612032)
Shenton's Elbow	6.0	Modelled flow at study site, using Collie River, Rose Road (612043)
Wellington Flume	14.0	Wellington Flume (612013) from 1 May to 30 September

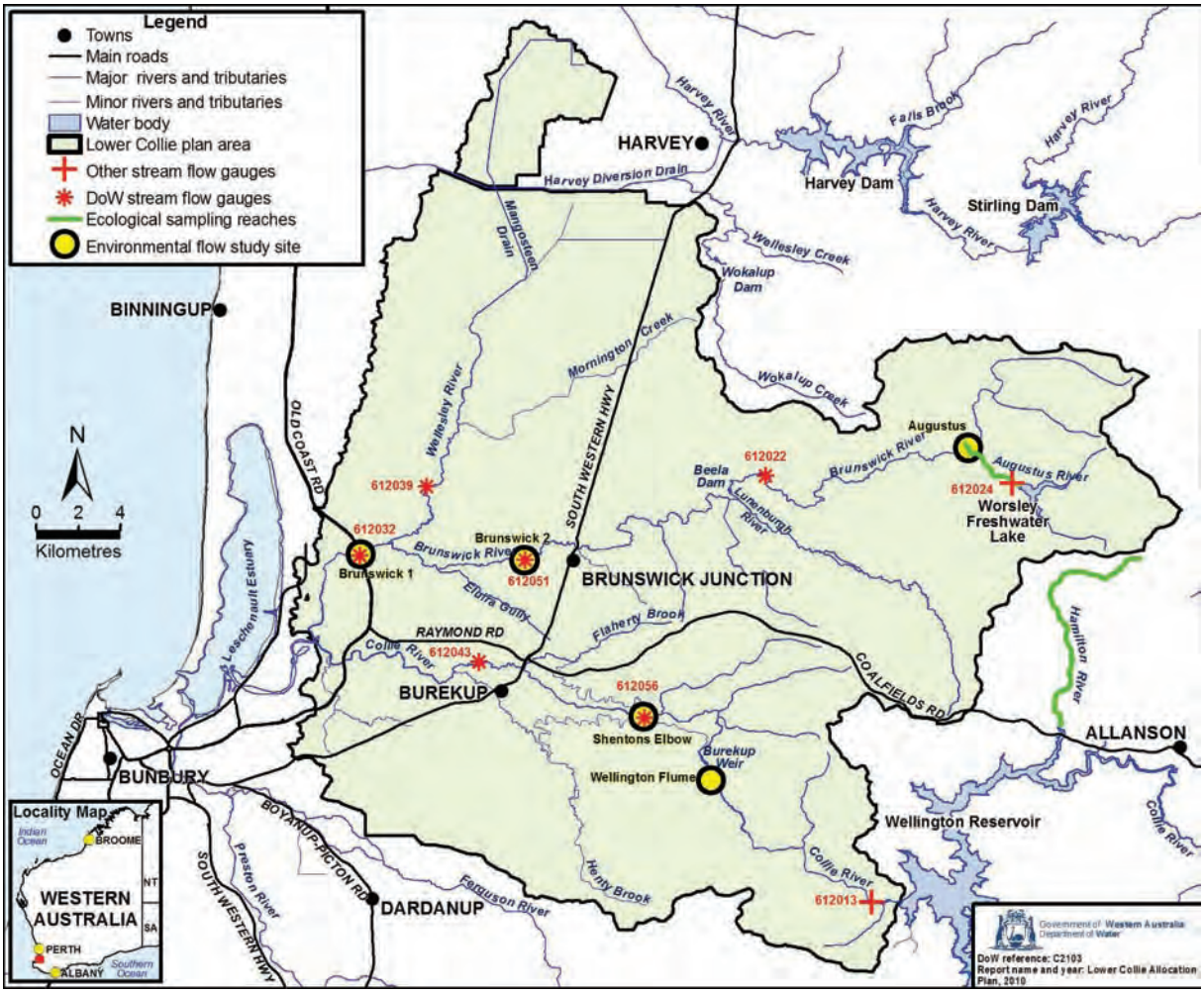

Figure 4 Streamflow monitoring sites and proposed reaches for ecological monitoring in the lower Collie plan area

Ecological monitoring

The Department of Water and Worsley Alumina Pty Ltd have begun an ecological monitoring program on the Augustus and Hamilton rivers.

The purpose of the monitoring program is to detect and assess the ecological changes that may occur in the Augustus River as a result of changes to how water is released from the Worsley Reservoir. Information from the monitoring program will inform the management of releases, licence conditions and the annual evaluation of the plan.

6.3 Review of the monitoring program

The department will review the current monitoring program while the plan is open for public comment. The review will ensure the final monitoring program is sufficient to evaluate the plan. The review will confirm:

- if new streamflow gauges are required to ensure sufficient monitoring coverage
- if any modifications are needed to the streamflow gauges that are currently being monitored (e.g. installation of new telemetry)
- if additional flow–ecology thresholds (in addition to the minimum flow thresholds) should be assessed as part of the annual evaluation process
- if additional ecological investigations are required to understand the relationship between ecology and surface water flow or to measure the ecological response to changes in the flow regime.

Any new ecological monitoring or investigations will be focused on river reaches where there are high ecological or social values combined with a high risk to those values from the storage, abstraction or diversion of water.

7 Implementing and evaluating the plan

This section sets out how the department will implement, evaluate and review the *Lower Collie surface water allocation plan*.

7.1 Implementing the plan

We have committed to the actions in

Table 6 to implement this plan. 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 6 Actions for implementing the plan

Actions for implementing the plan			
No.	**Action**	**Responsibility***	**Timeline**
Monitoring			
1	Develop and implement the monitoring program using the outcomes of the monitoring review (Section 6.2).	Environmental Water Planning/ Water Resource Assessment	2013
Resource assessment			
2	Revise the take and release rules for the Wellington Reservoir to reflect inflows to the reservoir under a drier future climate (refer Section 5.1).	Allocation Planning/ Water Resource Assessment	2012
3	Establish the social and environmental water requirements of the Brunswick picnic spot and the Henty Brook (refer to Section 4.5).	Environmental Water Planning/Water Allocation Planning	2015
4	Define the environmental water provision for the lower Collie River, downstream of Burekup weir, and include it in the final lower Collie surface water allocation plan (refer to Section 5.1)	Environmental Water Planning/Water Allocation Planning	2011
5	Work with licensees to measure spills over the Burekup weir (refer to Section 5.1)	Environmental Water Planning/Water Resource Assessment	2015

Actions for implementing the plan

No.	Action	Responsibility*	Timeline
6	Assess if, and by how much, streamflow in the plan area has declined and identify the climate scenario the streamflow trend most reflects. Use this information to guide evaluation of the plan.	Surface Water Resource Assessment	Every five years, to begin in 2015
Licensing			
7	Prioritise self-supply licence compliance in the lower Collie tributaries 5 and 8 and Brunswick 2, 4, 7 and 8[+].	South West region	2015
8	Harvey Water to develop an operating strategy which includes arrangements for managing: • water accounting • water quality • water-use efficiency.	South West region/Allocation Planning/Licensing	2011
9	Water Corporation to develop an operating strategy for the Wellington Reservoir, which details: • the release regime from the reservoir • the reservoir storage levels at which restrictions to consumptive use and environmental releases are triggered.	South West region/Water Allocation Planning	2011
10	Incorporate monitoring data and analysis from the ecological monitoring program on the Augustus and Hamilton rivers into management of the Worsley Pty Ltd licence.	South West region/ Environmental Water Planning	Annually
Evaluation statement			
11	Produce and publish an annual evaluation statement.	South West region	Annually

[+] *Additional licences in these areas can only be issued once existing unlicensed commercial use is verified and, subject to assessment, licensed. We estimate that unlicensed commercial use currently comprises greater than 20% of the allocation limit in these resources.*

* *Department of Water branch* responsible for the action.

7.2 Evaluating and reviewing the plan

Table 7 summarises the performance indicators that we will use to measure the performance of this plan against its objectives.

The performance indicators that relate to the quality and quantity of flow have been developed as part of environmental flow studies which define flow–ecology

thresholds. The *Lower Collie surface water allocation methods report* provides more detail.

We will release an annual evaluation statement each year to identify whether the plan is achieving its objectives and meeting the performance indicators. To prepare the statement we will summarise our assessment of:

- the allocation status for each resource and compare it with previous years (Table 2)
- the status of actions required by the plan in the evaluation period
- the status and trends of the water resources, including noting any new information on water quality
- performance against the plan objectives
- the need, if any, to amend or replace the plan.

Table 7 Plan objectives and their corresponding performance indicators and method of assessment

Objectives	Resource	Performance indicators	How will we assess it?
(a) Maintain a flow regime that reflects catchment rainfall and runoff.	Brunswick 1, 3	Flow regime in the Augustus River mimics flow regime in the Hamilton River by 2016.	Flow measured at the Augustus River gauge (612024) complies with the Worsley Pty Ltd operating strategy.
	Brunswick 2, 4, and lower Collie tributaries 1, 2, 4	Water use is within the allocation limit.	Estimate unlicensed use and licensed use and compare it to the allocation limit.
(b) Maintain a flow regime that supplies authorised use most of the time and meets 'key*' ecological and social requirements.	Lower Collie tributaries 3 and 5 (upstream of Burekup weir) and Brunswick 5,6,7,8,9,10,11	Authorised water users are able to take their full entitlement in more than 80% of years.	Assess the number and cause of complaints from licensees on the Brunswick and Collie rivers.
		Maintain dissolved oxygen during the summer low flow period above the required levels.	Assess if, and for how many days per year, flows fall below: • 1.7 ML/day on the Brunswick River at Cross Farm (612032) • 6.0 ML/day at Shenton's elbow – measured at Collie River, Rose Road (612043)
		Maintain macroinvertebrate habitat during winter so there is food available for native fish such as the pygmy perch.	Assess if, and for how many days per year, flows fall below 4.0 ML/day between 1 May and 1 September at the Wellington Flume (612013)
(c) Maintain a flow regime that supplies existing authorised use and meets the minimum ecological and social requirements.	Lower Collie tributaries 5, 6, 7, 8, 9, 10	Maintain dissolved oxygen during the summer low flow period above the required levels	Assess if, and for how many days per year, flows fall below 6.0 ML/day at Shenton's Elbow – measured at Collie River, Rose Road (612043).
		Maintain macroinvertebrate habitat during winter so there is food available for native fish such as the pygmy perch	Assess if, and for how many days per year, flows fall below 4.0 ML/day between 1 May and 1 September at the Wellington Flume (612013).

Objectives	Resource	Performance indicators	How will we assess it?
(d) Make as much water available as possible for consumptive use within the limits of the resource objectives.	All resources	Licensees are able to take their full entitlement in more than 80% of years.	Assess the number and cause of complaints from licensees on the Brunswick and Collie rivers and the Henty Brook.
(e) Release water from the Worsley Reservoir in a way that meets key* downstream ecological and social requirements.	Brunswick 1, 3	Summer flow in the Augustus River is maintained to 2016.	Flow measured at the Augustus River gauge (612024) complies with the Worsley Alumina Pty Ltd licence conditions.
		Flow in the Augustus River mimics flow in the Hamilton River post-2016.	Flow measured at the Augustus River gauge (612024) complies with the Worsley Alumina Pty Ltd operating strategy from 2016 onwards.
(f) Release water from the Wellington Reservoir in a way that meets key* ecological and social downstream requirements.	Lower Collie tributaries 3, 5, 8, 9, 10)	Flows in the lower Collie river meet key flow–ecology thresholds.	Flow at the Wellington Flume (612013) complies with the Water Corporation's operating strategy for the Wellington Reservoir.
(g) Promote water-use efficiency to improve water quality in the Wellesley River.	Wellesley 1, 2, 3	Water-use efficiency and water quality measures are included in all operating strategies that deal with water quality impacts in the Wellesley subarea	Licensees comply with water-use efficiency measures included in their operating strategies.

** The* Lower Collie surface water allocation plan methods report *(DoW 2011) defines the 'key' and 'minimum' ecological objectives for the lower Collie and Brunswick rivers.*

Glossary

The terms that are used the most in reference to water resource management of the lower Collie surface water allocation plan area 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.
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 purposes including irrigation, industry, urban and stock and domestic use.
Dam	Embankments constructed to store or regulate surface water flow. A dam can be constructed in or outside a watercourse.
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, e.g. lake, to include 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.
Environmental water provision	The water regimes that are provided as a result of the water allocation decision-making process taking into account ecological, social, cultural and economic impacts. They may meet in part or in full the ecological water requirements.
Flow–ecology threshold	Flow–ecology linkages describe the water depths and related flow rates which maintain populations of fish and macroinvertebrates, vegetation community structure and composition, water quality, channel geomorphology and ecosystem processes. The flow required to meet each flow–ecology linkage is estimated using survey information and observed streamflow.
Groundwater	Water which occupies the pores and crevices of rock or soil beneath the land surface.
Licence	A formal permit which entitles the licence holder to ‘take’ water from a proclaimed watercourse, wetland or underground source.

Water management objectives	The department of water develops management objectives to identify the ways in which we will implement the resource objectives in an area.
Over allocated	Sum of water access entitlements is more than 100% of the yield estimate.
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’.
Riffles	Swift-flowing areas, where the water is rippled or broken and cascades over rocks. Logs are known as riffle zone.
Riparian Right	‘Right of a riparian landowner to take water from a watercourse that flows through their property, unlicensed and free of charge for the purpose of stock and domestic use, without sensibly diminishing the flow of water downstream.
Reservoir	A natural or artificial place where water is collected and stored for use, especially water for supplying a community, irrigating land, furnishing power, etc.
Reservoir simulation	Computer simulations of reservoir behaviour are carried out to determine the quantities of water that can be reliably diverted from reservoirs or released to meet downriver water demands (including downstream environmental flows). Simulations of this type are used to determine how best to allocate and manage water resources given the available storage and the highly variable nature of stream flow.
Water resource objective	The Department of Water develops resource objectives to identify whether we need to maintain, increase, improve, restore or reduce surface and groundwater flow, and or water quality in an area.
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). Measurements are usually in milligrams per litre (mg/L) or parts per thousand (ppt).
Social value	A particular in-situ quality, attribute or use that is important for public benefit, welfare, state or health (physical and spiritual).
Springs	A spring of water naturally rising to and flowing over the surface of land, but does not include the discharge of underground water directly into a watercourse, wetland, reservoir or other body of water. If a spring is excavated, the take of water may require a groundwater licence.

Stock and domestic	Water that is used for ordinary domestic purposes associated with a dwelling, such as water for cattle or stock other that those being raised under intensive conditions; water for up to 0.2 hectares (if groundwater) or 2 hectares (if surface water) of garden from which no produce is sold. This take is generally considered a basic right.
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 can therefore be changed internally without being gazetted.
Surface water	Water flowing or held in streams, rivers and other wetlands on the surface of the landscape.
Streamflow	The net flow of water through a stream channel that integrates all contributing components, e.g., overland flow, interflow, and groundwater discharge.
Trade	Where an entitlement is permanently traded to another person and the water will be taken from another location. Note: A pre-requisite for a water transaction is accurate measurement (i.e. metering).
Transfer	Where an entitlement is permanently transferred to another person but water will be taken from the same location.
Unallocated crown land	Means crown land: • in which no interest is known to exist, but in which native title within the meaning of the *Native Title Act 1993* of the Commonwealth may or may not exist • which is not reserved, declared or otherwise dedicated under the *Native Title Act 1993* or any other written law
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).
Water entitlement	The quantity of water that a person is entitled to take annually in accordance with the *Rights in Water and Irrigation Act 1914* or a licence.
Yield estimate	Establishes the amount of water that can be abstracted whilst still meeting the environmental water objectives for the resource.

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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WRC – *see* Water and Rivers Commission

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