



Esperance groundwater area water management plan: Evaluation statement 2007–2011

This statement evaluates the extent to which the objectives of the *Esperance groundwater management plan* were met since its release in May 2007.

Evaluation statements are part of the Department of Water's adaptive management process and allow us to continually review and improve management of water resources.

1 Allocation status

1.1 Changes in allocation status

There are no resources in the Esperance groundwater area that changed allocation status since 2007.

Water is available in the superficial aquifer in the Butty subarea to cater for the town's future water needs. Water is also available in the Warden subarea; however this resource is a low yielding fractured rock aquifer with poor water quality. There is limited water available in the superficial aquifer in both Twilight and Town subareas.

For a full list of up-to-date water availability in all resources contact the South Coast regional office in Albany or see our water register, www.water.wa.gov.au/ags/WaterRegister/.

2 New allocation issues

Four new allocation issues were identified in the groundwater area. The issues were identified in the media and the results of licensee reporting, monitoring and investigation work carried out across the plan area. Our response to these issues is described in Table 1.

Table 1 *New allocation issues that were raised during evaluation period*

Issue	Our response
Salt water intrusion	<p>Managing the impacts of abstraction for public water supply on the salt water interface</p> <p>We reviewed the Water Corporation’s salt water interface monitoring data from 2005–2010 together with ground geophysics work completed by the department in 2009 and 2010. The data shows evidence of increasing salt water intrusion from the coast in the Town subarea that may extend further inland into the groundwater resource.</p> <p>As the Esperance town water supply scheme production bores account for 80% of the total annual abstraction in the Town subarea, it is likely that the risk to the resource is due to abstraction for public water supply needs. The Water Corporation will lead the investigation as part of their licence requirements to address these issues.</p> <p>We recommended to the Water Corporation a review of current monitoring locations and procedures to ensure that increasing saline intrusion is adequately tracked, and appropriate responses implemented. A management regime may need to be added to the Esperance water resource management operating strategy (which is under revision) to specifically address this issue.</p> <hr/> <p>Managing the impacts of dewatering on the salt water interface</p> <p>Monitoring results show that saline upconing occurred with a Shire of Esperance dewatering project for residential development in the western portion of the Town subarea. Dewatering ceased and monitoring will continue to identify any likely long-term impacts. The development site is near Bandy Creek and the coast.</p> <p>The impact of dewatering at this site highlighted the need for licensing, monitoring and carefully managed abstraction rates to avoid saline upconing on any future dewatering projects in the plan area.</p>
Acid sulfate soils	<p>In 2009 the Department of Agriculture and Food conducted acid sulfate soil hazard mapping¹ which identified potential acid sulfate soils across the Esperance groundwater area. This information will be considered when assessing new bore construction, dewatering and excavation proposals in the plan area.</p>
Carting water for drought relief	<p>The region experienced below average rainfall over the past two years that affected the availability of water. As this trend is likely to continue, the future replacement of the plan will need to address this issue.</p> <p>It is a priority for both the department and the Water Corporation to support drought relief in the region by supplying water from the Esperance groundwater area. The volume of water carted each year from the Esperance town water supply to meet drought relief is presented in Appendix 1. This volume is very small compared with the volume abstracted each year to meet the town’s water supply needs.</p>

¹ Galloway P and Clarendon S 2009, *Esperance area acid sulfate soil hazard mapping*, Resource management technical report 347, Department of Agriculture and Food, Western Australia, Albany, viewed November 2011, www.agric.wa.gov.au/objtwr/imported_assets/content/lwe/land/rmtr_mapping_esperance.pdf.

3 Implementation actions

The following actions form part of implementing *Esperance groundwater management plan* (Table 2). They are listed throughout the plan text. They are tabulated and evaluated here to help review the plan's performance. These actions do not have a completion date.

Table 2 Summary of progress towards actions for implementing the plan

	Action	Status	Evaluation
1	Review ecological water requirements (EWR) and other values if demand increases significantly	Met	<p>Demand for water is relatively stable and no resources are over-allocated. Ecological water requirements will be reviewed if demand increases.</p> <p>To support any future reviews we completed the following:</p> <ul style="list-style-type: none"> • Evaluation of wetland sites in 2007 • Determination of depth-to-watertable dataset² • Determination of potential groundwater-dependent ecosystems (GDE) by overlaying depth to watertable dataset and wetland suites. <p>Initial work indicates two discrete areas where more detailed GDE and EWR work may be required:</p> <ul style="list-style-type: none"> • South of Pink Lake in the Twilight subarea • Northern boundary Butty subarea which is required if the Water Corporation expands abstraction into this subarea. <p>Work is still required to:</p> <ul style="list-style-type: none"> • Refine potential GDE maps • Confirm that identified potential GDE are actual GDE by drilling investigations • If drilling investigations confirm GDE, develop EWR to ensure GDE are not affected by increased abstraction. • If drilling investigations confirm GDE, develop GDE monitoring to complement existing groundwater monitoring undertaken by the Department of Environment and Conservation (DEC). <p>This work is not scheduled given the current low level of risk associated with the location of potential GDE in relation to existing and proposed abstraction.</p>
2	Conduct bore and garden use survey in the Town subarea	Not met	<p>Surveys of bore and garden use in the Town subarea are yet to be completed. This involves approximate quantification of domestic use and identification of use greater than the current domestic exemption. Completion of this work will initiate licensing for non-compliant use.</p>

² Parsons Brinckerhoff Australia Pty Ltd, 2007, *Identification of groundwater dependent ecosystems, Esperance groundwater area*, report prepared for Department of Water, Perth

Action	Status	Evaluation
3 Review of stock and domestic requirements for Esperance	Partially met	Stock and domestic bores (for properties <0.2 ha) in the Esperance groundwater area are exempt from licensing. We completed a desktop survey of stock and domestic use that identified some large areas of irrigated pasture (>0.2 ha) in the Town subarea. We now need to complete field surveys to verify the aerial photo survey as this type of use is not covered by current exemptions and requires licensing.
4 Conduct water use surveys for: <ul style="list-style-type: none"> • Water Corporation • Other large users 	Partially met	<p>We completed the majority of licence surveys from 2008-11. We focused the surveys for licence compliance in the Town and Twilight subareas.</p> <p>We surveyed all licensed users in the Town subarea in 2009. These included Shire of Esperance licences for shandyng and public open space. We recouped 117 500 kL/yr from the Shire of Esperance and 26 000 kL/yr from CSBP Limited during this process.</p> <p>Large private licensees in the Twilight subarea were also surveyed during 2009.</p> <p>We surveyed the Water Corporation licences for the entire well field in the Town, Twilight and Butty subareas.</p> <p>We completed the Shark Lake hydrology assessment and licence survey in the Warden Subarea. Further surveys are not required in the Warden fractured rock resource because of the low yields and poor water quality.</p> <p>The remaining surveys required are the Department of Education and Training licences in three locations.</p>
5 Review monitoring information of licensees (primarily the Water Corporation's regional monitoring)	Met	<p>Water Corporation licence compliance was reviewed using the annual Water Monitoring Summaries up to 2010 and the three-yearly Groundwater Monitoring Review (2005-2008).</p> <p>The department will be working with Water Corporation on a review of the Esperance Town Water Supply Scheme operating strategy to improve monitoring procedures (salt water interface monitoring and water level monitoring) and data quality. The department's minimum reporting requirement guidelines will assist in achieving these improvements.</p> <p>Review of the Town subarea monitoring data reported in the 2009 and 2010 annual Water Monitoring Summary indicates that abstraction should be reduced, as water quality in this resource is diminishing as a result of contaminants, salt water intrusion and saline up-coning. Pumping strategies are in place to minimise saline upconing, and monitoring to assess movement of nitrate contamination plumes.</p> <p>A shift to increased abstraction to the Butty subarea is the preferred long-term supply option for public water supply. Recommendations were made since 1998 for a reduction in abstraction from the Town subarea and an increase from the Twilight and Butty subareas. The plan supports this shift.</p>
Score:	3/5	
Rating:	Adequate	

4 Plan performance

The *Esperance groundwater management plan* was developed before performance indicators and measurable objectives became a standard component of allocation plans. The objectives listed below were taken from various sections of the plan and combined to show how we the Department of Water is evaluating its performance against them.

4.1 Information used to assess the plan objectives

We reviewed the licensing and monitoring data collected by the department to assess our performance against meeting the plan objectives. Table 3 presents a summary of the information we used to decide if Objective 1 was met (see Table 4 below). This ensures that the groundwater resources are allocated equitably and used sustainably in the long term.

Table 3 Summary of performance indicators used to assess objective 1

Performance indicator	Summary information
Maintain groundwater levels within an acceptable range	<p>Town subarea: The aquifer is at risk of saline intrusion from the coast. Water levels show a decline west of the residential area where a cone of depression formed. Hydrographs show water levels at most bores in the cone of depression remained steady over the long term.</p> <p>The exceptions are production bores 23 and 24 where levels showed a gradual decline over the long term, to well below 0 m AHD and remained at or near this level. Bore 23 was reported as – 2.65 m AHD (below sea level) at the end of summer 2008.</p> <p>Of major concern in 2009 is that rest water levels for some bores in the Water Corporation’s borefield were reported as being at their lowest since April 2004. These include nine bores in the Town subarea and two bores in the Twilight subarea.</p> <p>Twilight subarea: Groundwater levels are generally stable. However, we need to confirm that the drawdown cone is not increasing. See the comment in the Town subarea above about the two Water Corporation bores.</p> <p>Butty subarea: Groundwater levels are stable.</p> <p>Warden subarea: Rising groundwater levels are evident as a result of agricultural drainage and clearing.</p> <hr/> <p>Water quality: One third of monitoring bores showed increasing nitrate levels in the Water Corporation’s annual 2009 Water Monitoring Summary, with the existing nitrate plume shifting westwards.</p> <p>Saline upconing in the Town subarea is an ongoing issue which is evident in the Water Corporation’s Water Monitoring Reviews from 1998, 2002, 2005 and 2008.</p>

Performance indicator	Summary information
	<p>Modelling: The Esperance groundwater area modelling report, produced in 2011, and the associated model are undergoing verification by the department. The model will be used to assess groundwater levels and abstraction impacts which will inform future evaluations.</p>
<p>Minimise movement of saltwater interface</p>	<p>We reviewed the Water Corporation's 2009 and 2010 saltwater interface monitoring data. The review indicates that saltwater intrusion in the Town subarea is increasing at the coast with the ingress possibly extending further inland.</p> <p>Further review of the abstraction regime, monitoring locations and procedures is required to adequately track any increasing saline intrusion and implement appropriate responses. These changes will be implemented through the updated operating strategy.</p> <p>Two areas of saline upconing are a reoccurring issue in the Town and Twilight subareas. If regular monitoring indicates that the drawdown cone is increasing, we need to ensure that appropriate management actions are undertaken and incorporated into licence conditions.</p> <p>Additional saline upconing occurred in the coastal and Bandy Creek portion of the Town subarea during 2010 as a result of a Shire of Esperance dewatering project. Dewatering ceased and monitoring continues, but salinity levels have not yet fully recovered.</p>
<p>Monitor groundwater-dependent ecosystems to maintain lake-levels</p>	<p>The Department of Environment and Conservation undertakes water level monitoring of seven lakes in the Esperance Lakes Nature Reserve, adjacent to the Town and Warden subareas.</p> <p>Dewatering of Lake Wheatfield (discharging into Bandy Creek) takes place to control rising water levels to prevent the loss of waterbird habitat (riparian vegetation).</p> <p>Dewatering of Lake Warden is currently under assessment. Lake water level and quality data is obtained from the Department of Environment and Conservation.</p>
<p>Maintain groundwater pH in the superficial aquifer</p>	<p>Reported pH levels (2001–2004 data compared with 2005–2008 data) in the Butty, Town and Twilight subareas are stable.</p>

4.2 Objectives

Table 4 Objectives and their status

Objective	Status	Evaluation
1 Ensure that the groundwater resources are allocated equitably and used sustainably in the long-term.	Partially met	<p>Current use of the superficial aquifer in the Town and Twilight subareas is not sustainable in the long-term based on current monitoring data (see Table 3). We will improve how water is allocated and used by:</p> <ul style="list-style-type: none"> • improved monitoring by licensees to verify where impacts are stabilising or increasing • reviewing and updating of licence conditions, including operating strategies, to put in place appropriate management responses • recommend the shift of abstraction to spread the draw on the resource and/or altering the abstraction regimes currently in place <p>Current allocation of groundwater is under the limits set for each resource (subarea and aquifer). Water is still available for use, particularly in the Butty subarea.</p>
2 Prescribe the rules and protocols that will apply in assessing licence applications and water resource development proposals, and the issue of groundwater resource entitlements	Met	This objective is met by implementing this plan.
3 Prescribe the monitoring requirements for the groundwater resource and the ecological systems dependent on it.	Met	<p>Groundwater resource monitoring (both water levels and water quality) is undertaken by licensees in accordance with their licence conditions. Monitoring requirements are reviewed regularly.</p> <p>Monitoring requirements for the Esperance town water supply scheme water resource management operating strategy (a condition of the licence) are being reviewed and negotiated with the Water Corporation.</p> <p>Monitoring of currently identified groundwater-dependent ecosystems is undertaken by the Department of Environment and Conservation.</p>
Score:	2.5/3	
Rating:	Good	

5 Evaluation of management set out in plan

Water use in the Esperance groundwater area remained stable from 2007–2011. The allocation limits set in the plan are sufficient to cater for the predicted future demand in this area. No resources are over-allocated.

The Butty subarea has the most groundwater available for licensing. It is the preferred long-term option for town water supply. Further work on groundwater modelling and confirmation of potential groundwater-dependent ecosystems are needed to support this longer term option.

We are progressively improving our performance in carrying out the actions and meeting the objectives in the plan. Ongoing and additional work is still required. This includes how we are managing groundwater use, the saltwater interface, and upconing of saline water into the freshwater resources. These issues will be managed through individual licences and their associated monitoring conditions and reporting requirements. This will ensure that any further changes are adequately tracked, and appropriate management responses are implemented. This may include reducing or moving abstraction and altering pumping regimes.

We will resolve the new allocation issues raised during the evaluation period by working with the Water Corporation on the Esperance Water Resource Management Operating Strategy (currently under review) and licensees with dewatering projects.

6 Response to this evaluation

We identified through this evaluation that the existing plan is suitable to remain in place until the next evaluation. The plan is not scheduled for replacement, as the current management approach is meeting the plan's objectives. The need to replace the plan will continue to be considered each year through the evaluation process.

6.1 Work required to improve our performance implementing the plan

Sound water quality and groundwater level information provides the basis for assessing our performance against the plan's objectives and informs licensing and allocation decisions in the Esperance groundwater area. The quality of data and reporting submitted by licensee's can affect decision making related to groundwater abstraction.

The following are priority actions for maintaining the performance of this plan:

- 1 Improve reporting requirements for Esperance town water supply scheme for compliance with licence conditions.
- 2 Review data collection methodology and procedures. Water quality and groundwater level data is collected as part of licensee reporting requirements.

We made the following recommendations to the Water Corporation to apply to the Esperance Water Resource Management Operating Strategy:

- a Continue modelling of the western portion of the Eastern Flow System to fill gaps in understanding of aquifer parameters and to determine safe abstraction rates.
- b Undertake a review of the existing monitoring frequency carried out in the Town, Twilight and Butty subareas, as required by the current operating strategy.

6.2 Work required for the next plan

There are particular components of the plan that will require consideration when the plan is replaced. They are:

- Clear and measureable performance indicators and objectives.
- Confirm potential groundwater-dependent ecosystems by drilling investigations. This includes a small area on the northern boundary of the Butty subarea. As there is no private licensed use in this subarea the department will lead this work.
- Set environmental water requirements for confirmed groundwater-dependent ecosystems likely to be at risk of groundwater abstraction.
- Where required, develop monitoring of groundwater-dependent ecosystems to complement the current groundwater monitoring.
- Map and identify the current and historical changes of the salt water interface and changes in the area of groundwater abstraction drawdown (cone of depression). Determine if the movement is significant and identify the appropriate management strategies to address the changes.
- Develop licensing policy, rules and conditions to manage the affects of water quality changes, particularly as a result of saltwater intrusion, acid sulfate soils and nutrient contamination.

Rating system

Rating	Description
Good	70 to 100% of performance indicators, objectives and/or actions met
Adequate	40 to 70% of performance indicators, objectives and/or actions met
Poor	Less than 40% of performance indicators, objectives and/or actions met

Appendix 1 – Water carting for drought relief from the Esperance groundwater area

Groundwater from the Esperance groundwater area is often carted outside the plan area for use in drought relief. The water abstracted is managed using the plan, under current licensing arrangements. However, the carting of water is not managed by the department. This is regulated by the Water Corporation.

Annual average use between 2007-2011 was 3879 kL/yr. This figure was highly variable with a range of 1370 to 6415 kL/yr. The total volume exported in the last five years (up to June 2011) was 19 395 kL.

Table 5 Summary of water carting from the town water supply in the Esperance groundwater area to meet drought relief, 2007–11

Year	Salmon Gums borefield kL	Grass Patch borefield kL	Total exported from the plan area kL
2007	0	1370	1370
2008	3928	2487	6415
2009	2250	3535	5785
2010	550	2000	2550
2011	2175 (to June only)	1100 (to May only)	3275
Total	8903 (to June 2011)	10 492 (to May 2011)	19 395