



Dinner Hill subarea

Allocation statement

Groundwater in Dinner Hill sustains highly valued water uses, including several large agricultural initiatives and Moora's town water supply. Located around 150 kilometres north of Perth, the Dinner Hill subarea covers around 1700 square kilometres and includes the Leederville–Parmelia, Mirrabooka and Surficial aquifers.

Dinner Hill is a subarea of the Jurien groundwater area (Figure 1), which is proclaimed under the *Rights in Water and Irrigation Act 1914*. The Department of Water and Environmental Regulation's *Jurien groundwater allocation plan* guides water licensing in all aquifers of the Jurien groundwater area. This allocation statement incorporates new information to direct how we manage groundwater abstraction in Dinner Hill and is to be read in conjunction with the plan.

The Leederville–Parmelia aquifer is the most prospective aquifer for large-volume water licences in Dinner Hill. Its water supply potential is a focus of the Midlands Groundwater and Land Assessment of the Water for Food program, a state government initiative to realise the state's irrigated agriculture potential. This allocation statement forms part of that assessment. From these investigations, this statement confirms an increase in the allocation limit from 12.6 GL to 16.2 GL per year (Table 1).



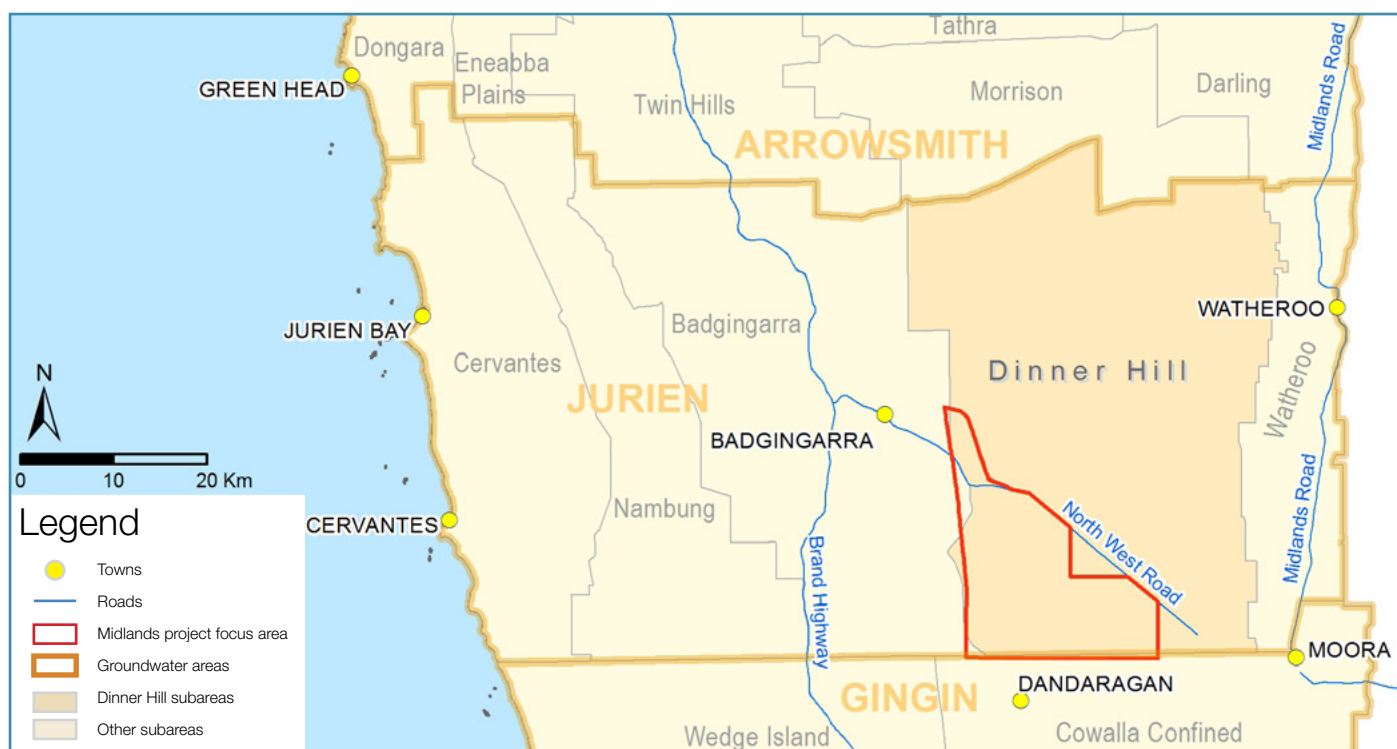


Figure 1: Location of the Dinner Hill subarea in relation to the Gingin, Jurien and Arrowsmith groundwater areas

Table 1: Allocation limit changes for the Leederville–Parmelia aquifer in Dinner Hill

Allocation limit kL/year		Allocation limit components kL/year			How much additional water was released?	
		Public water supply	Public water supply reserve	General licensing		
Original (2010) ¹	12 600 000	650 000	1 500 000	10 450 000	Limited	0
New (2018)	16 200 000	650 000	1 500 000	14 050 000	Yes	3 600 000

¹ Jurien groundwater allocation plan, Department of Water 2010.

Maintaining groundwater throughflow to the Gingin groundwater area

Dinner Hill contributes considerable groundwater flows to the Cowalla Confined subarea of Gingin groundwater area. This means aquifer depletion in Dinner Hill would affect groundwater availability in Cowalla Confined. The new allocation limit takes this into account and has been set to minimise any impacts on groundwater throughflow.

The department is reviewing the hydrogeology of these two connected resources in the East Midlands project of our State Groundwater Investigation Program. We will use the new data from this project to further review the abstraction capacity of the aquifer in both Dinner Hill and Cowalla Confined and improve how we manage abstraction across the two subareas.

Understanding the aquifer system

In 2017 the department completed a new, three-dimensional conceptual model of the Dinner Hill aquifers (Figure 2). This and other analyses showed that more groundwater can be taken, allowing for the increase in the allocation limit.

This work also shows that we need to manage local-scale abstraction carefully to avoid causing adverse impacts on water quality, water supply and dependent ecosystems. Excessive pumping may cause saline water to be drawn into fresh parts of the aquifer and increase groundwater drawdown at bores, soaks, and sensitive ecosystems.

Managing how groundwater is taken at a local scale means:

- spreading abstraction across the subarea
- monitoring groundwater salinity and water levels
- changing abstraction patterns if monitoring data alerts us to adverse changes.

To do this, we encourage groundwater users to work with the department to actively manage the resource. This way, the aquifer will continue to yield good quality water at an acceptable pumping depth to sustain business and community uses and environmental values.

Fresh groundwater is limited

Local abstraction rates must be managed to avoid drawing brackish or saline water into fresher parts of the aquifer. Bores are typically installed in parts of the Leederville–Parmelia aquifer that contain fresh, good quality groundwater. These parts are often beside, above or below more saline groundwater which can be drawn in if abstraction rates are too high.



Groundwater-dependent ecosystems are valuable to farmers

Where groundwater is shallow and discharges at the land surface, the farm values of groundwater typically coincide with the cultural and ecological values of groundwater. Groundwater discharges into rivers, wetlands, and soaks, which provide water for growing crops and drinking water for stock. Groundwater-dependent vegetation provides stock shelter (trees) and food (wetland pasture and plants), prevents erosion and enhances water quality.

Groundwater-dependent ecosystems in Dinner Hill include sites of Aboriginal cultural significance. They also include habitat for Carnaby's Black-Cockatoos (*Calyptrorhynchus latirostris*) and Banksia woodland communities, both of which are nationally significant and endangered. Groundwater-dependent vegetation along rivers provides important habitat corridors for native animals.

Groundwater-dependent ecosystems in Dinner Hill may be sustained by one or more of these aquifers (Figure 2):

- the Leederville–Parmelia aquifer (along the Minyulo Brook and the Coonderoo River, near Lake Dalaroo, and over the Yallalie Basin)
- the Mirrabooka or Surficial aquifers (above the Kardinya Shale)
- localised perched aquifers (particularly in the west and north-west of the subarea).

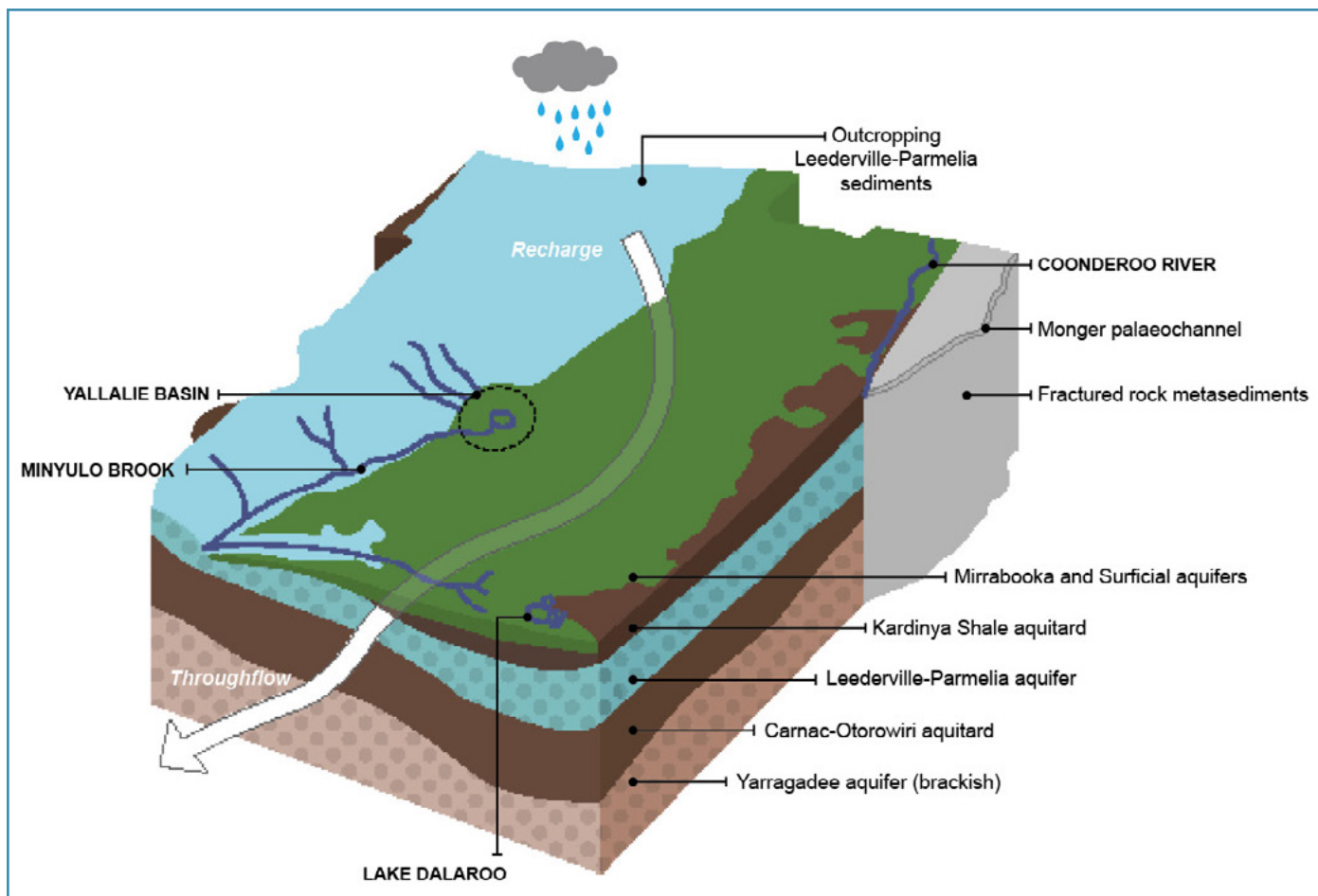


Figure 2: Conceptual model of the aquifers in Dinner Hill and how they interact with each other and the land surface

Rising groundwater and climate change

Groundwater levels in the Leederville–Parmelia aquifer in Dinner Hill have been rising since the 1970s because of increased rainfall recharge following clearing of deep-rooted native vegetation in the 1960s. This represents a significant increase in aquifer storage and has occurred despite a marked decline in rainfall over the same period.

Climate is projected to dry further in the future. As rainfall declines, recharge will decline rapidly. By 2030 annual recharge is projected to fall by one third from the average annual recharge over 1970–2017. This is accounted for in the new allocation limit. We will also consider this effect on groundwater availability across the aquifer system after the East Midlands groundwater investigation is complete.

The effects of current water use

Three quarters of groundwater licence entitlements are clustered together north-west of Moora (Figure 3). This concentrated abstraction poses ongoing risks to groundwater levels and quality, and we will work with licensees in this area to monitor and manage these risks. Since 2000, groundwater levels in this area declined 13 m. This will intensify and broaden geographically if licensees use more of their entitlements – recently use has only been around 60 per cent. Increased salinity, observed in one location so far, may also broaden if more water is used.

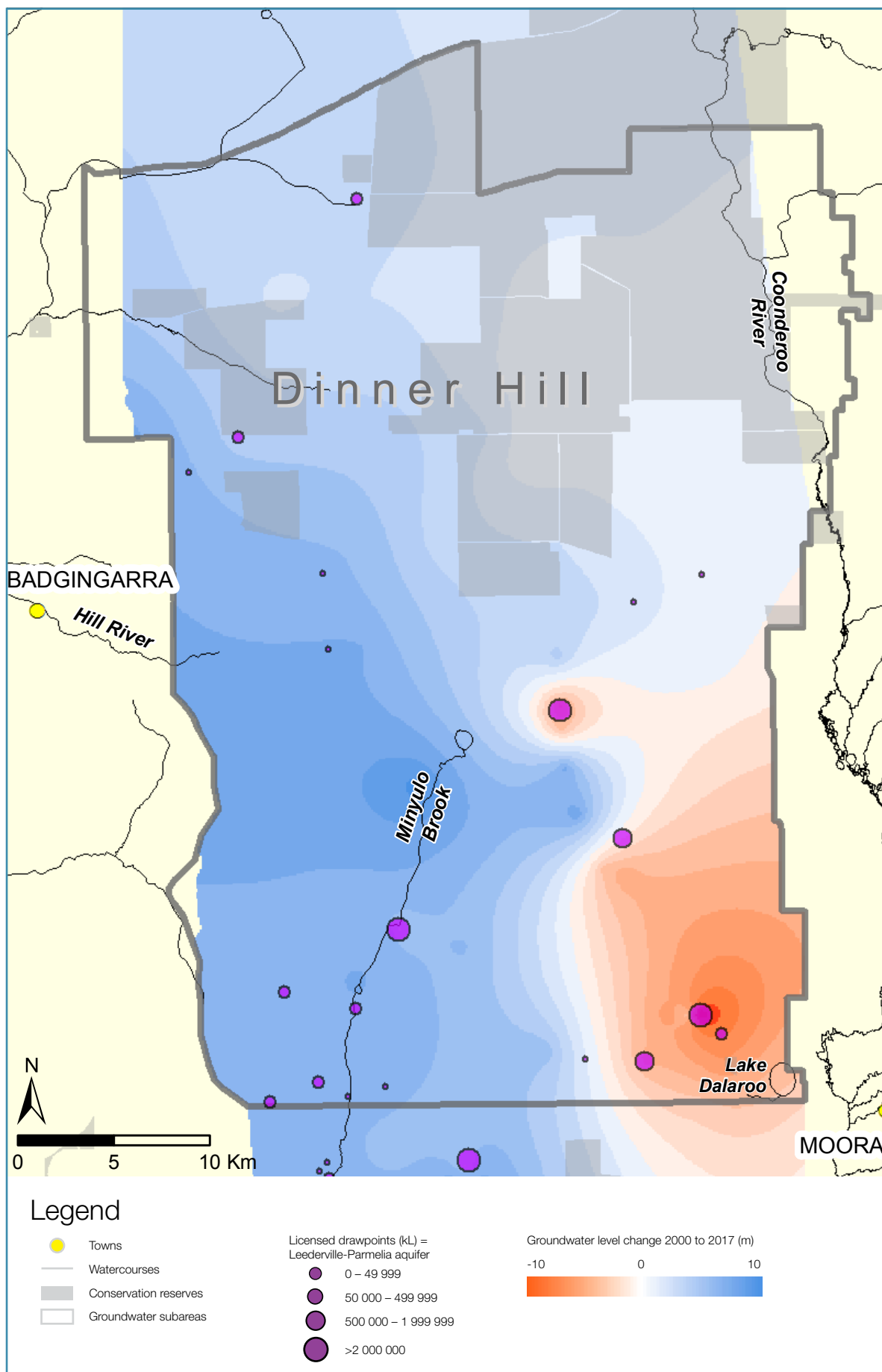


Figure 3: Groundwater level changes in the Leederville–Parmelia aquifer during 2000–2017 in relation to distribution of groundwater licence entitlements



Licensing groundwater in Dinner Hill

To grant a water licence, the Department of Water and Environmental Regulation must be satisfied that the impacts of abstraction will be acceptable for the water resource, current and future water users, and the environment. When we assess licence applications, we consider:

- the location of proposed bores within the subarea
- the amount to be drawn from each bore
- the proximity of bores to areas of saline groundwater and sensitive features like other bores and groundwater-dependent ecosystems.

Abstraction bores that are too close together pumping large volumes of groundwater or which are near to a sensitive feature have higher risks of unacceptable impacts.

As well as supporting a sustainable water resource, the licensing process asks applicants to confirm the resource's capacity to provide the water needed over the full life of their project, providing greater water supply certainty.

Areas to apply for water

For a sustainable resource, the best areas to abstract more groundwater from the Leederville–Parmelia aquifer are the northern parts and the western parts of Dinner Hill (see area outlined in Figure 3). In these areas, licence entitlements are low, groundwater levels are still rising, and there is limited risk of groundwater decline affecting groundwater-dependent ecosystems. Licence applications in these areas are likely to be simpler and less costly to prepare than in areas near sensitive ecosystems and where clusters of entitlements already exist.

Development plans and timelines

To foster productive use of water licence entitlements and minimise unused entitlements, the department will only consider granting licence entitlements for projects with adequate resources and clear plans to develop. For requests for more than 500 000 kL/year or that involve the transport of water outside of the Dinner Hill subarea, the department may request a project description which may include:

- a business case
- project timelines
- feasibility analysis
- demonstration of financial resources.



Local licensing objectives

To make sure we manage groundwater in line with the objectives of the *Jurien groundwater allocation plan*, we have defined specific licensing objectives and policies for Dinner Hill. For each objective, 'low-risk indicators' are defined to guide how we assess the key risks from groundwater abstraction (Table 2). If the predicted impact of abstraction is less than the 'low-risk indicator', the department will consider the abstraction to pose low risk to the licensing objective.

The department will use Table 2 to streamline the approval of low-risk applications and to establish the scope of supporting information required for higher-risk applications.

Applicants may use Table 2 to design applications that pose minimal risk to the local licensing objectives and are therefore straightforward to approve. This may involve locating bores away from sensitive features like other bores and groundwater-dependent ecosystems and seeking entitlement volumes that minimise groundwater decline at these features.

The department may consider approving an application despite risk to one or more of the licensing objectives, if the risk is manageable. The applicant will be requested to prepare an operating strategy for monitoring and managing the risks, and the department will apply Table 2 to assess if the strategy is adequate and to negotiate changes if needed.

Resources for licence applications

Key references to support water licence applications are available from www.dwer.wa.gov.au/water:

- [Water licensing information](#) (under Water licensing), along with the [policies and guidelines](#) which apply (under Legislation).
- The [Water Register](#) which provides up-to-date information on existing water licence entitlements (under Maps).
- The [Jurien groundwater allocation plan](#) and related information (under Water allocation plans), including this allocation statement, the allocation limit methods report, a report on the Groundwater-dependent environmental values of the Dinner Hill and Midlands focus areas, and guidance on drawdown impact assessment in [Environmental considerations for groundwater management in the Northern Perth Basin](#).
- The [Northern Perth Basin Bulletin](#) (under Groundwater).

An unpublished hydrogeological report (report number HR384) describing the three-dimensional conceptual model for Dinner Hill and related recharge and throughflow calculations is available by contacting midwestgascoyne@dwer.wa.gov.au.

Table 2 - Local licensing objectives and policies and other information to guide groundwater licensing in Dinner Hill

Jurien plan objective (a): Maintain adequate groundwater levels to sustain the renewable capacity of the resource			
Licensing objective	Local licensing policies	Low-risk indicator	Examples of supporting information
<p>A1. Bores of other groundwater users</p> <p>Objective: Avoid significant drawdown at the bores of other licensed groundwater users.</p>	<p>For a licence to be granted:</p> <ul style="list-style-type: none"> the low-risk indicator for this objective must be met or supporting information is available which shows that the objective will be met. 	<p>Predicted drawdown is less than 2 m over 10 years (cumulatively) at other bores in the Leederville–Parmelia aquifer (Figure 5a), based on calculations by the department.</p>	<ul style="list-style-type: none"> Other hydrogeological predictions using methods and parameters endorsed by the department. An operating strategy outlining how the applicant will monitor groundwater and respond promptly to adverse impacts to make sure the objective is met. A formal agreement with the affected groundwater user to allow greater drawdown (with or without a ‘make good’ arrangement).
<p>A2. Moora town water supply bore field</p> <p>Objective: Mitigate cumulative drawdown impacts at Moora’s town water supply bore field.</p>	<p>For a licence to be granted:</p> <ul style="list-style-type: none"> the low-risk indicator for this objective must be met or supporting information is available which shows that the objective will be met. 	<p>Predicted drawdown is less than 1 m over 10 years (cumulatively) at Moora’s town water supply bore field (Figures 4 and 5a), based on calculations by the department.</p>	

Jurien plan objective (a): Maintain adequate groundwater levels to sustain the renewable capacity of the resource

Licensing objective	Local licensing policies	Low-risk indicator	Examples of supporting information
<p>A3. Areas of concentrated abstraction</p> <p>Objective: Minimise further abstraction in areas of concentrated licence entitlements and groundwater decline.</p> <p>Objective: Maintain a low risk of drawing brackish or saline groundwater into fresher parts of the Leederville–Parmelia aquifer (see also row C1).</p>	<ul style="list-style-type: none"> The department will recoup unused entitlements in line with our policy on Management of unused licensed water entitlements. The department will refuse applications to trade unused entitlements inside the Moora Zone (Figure 4) The department will support trading of unused entitlements from the Moora Zone (Figure 4) to other locations in Dinner Hill if supporting information shows all licensing objectives will be met. Unused entitlements will only be transferred with the sale of a property for the original usage on the licence. If a new usage is proposed, the department will assess water requirements to determine the transferrable volume. New applications and increases to existing entitlements in the Moora Zone (Figure 4) will be considered high risk to the resource and other groundwater users. The department will refuse these applications unless supporting information shows all licensing objectives will be met. New licence entitlements and increases to existing entitlements near the southern parts of Minyulo Brook may be constrained by existing entitlement volumes in that area (see Figure 3). 	<p>Apply low-risk indicators for any relevant objectives in rows A1, A2, B1, B2, C1 and C2.</p>	<p>See examples of supporting information for any relevant objectives in rows A1, A2, B1, B2, C1 and C2.</p>

Jurien plan objective (b): Manage the needs of groundwater-dependent ecosystems by maintaining adequate groundwater levels in unconfined and semi-confined aquifers

Licensing objective	Local licensing policies	Low-risk indicator	Examples of supporting information
<p>B1. Farm soaks and aquatic habitats (river baseflow and wetlands)</p> <p>Objective: At farm soaks, wetlands and watercourses, avoid drawdown at magnitudes that will:</p> <ul style="list-style-type: none"> degrade the viability (required depth or quality) of the farm water source for existing use affect the water quality or habitat suitability of aquatic ecosystems. 	<p>For a licence to be granted:</p> <ul style="list-style-type: none"> the low-risk indicator for this objective must be met or supporting information is available which shows that the objective will be met. 	<p>Either:</p> <ul style="list-style-type: none"> all farm soaks and aquatic ecosystems in the area of predicted drawdown are dependent on another aquifer (Figure 4)¹ or predicted drawdown is less than 0.1 m over 10 years (cumulatively) at soaks, baseflow zones and aquatic habitats (Figure 5b), based on calculations by the department. 	<ul style="list-style-type: none"> Reference to Figure 4. Other hydrogeological predictions using methods and parameters endorsed by the department. An operating strategy outlining how the applicant will monitor groundwater and respond promptly to adverse impacts to make sure the objective is met. A formal agreement with an asset manager (for example, Department of Biodiversity, Conservation and Attractions) that allows a higher risk than the low-risk indicator for these objectives. Investigations of ecological response to changed water regimes to help support existing drawdown risk thresholds, or set new ones. Appraisal of predicted ecological outcomes against the thresholds for acceptable impacts outlined in environmental legislation and policy².

Jurien plan objective (b): Manage the needs of groundwater-dependent ecosystems by maintaining adequate groundwater levels in unconfined and semi-confined aquifers

Licensing objective	Local licensing policies	Low-risk indicator	Examples of supporting information
<p>B2. Native vegetation</p> <p>Objective: Avoid drawdown at rates and magnitudes that will cause death of native vegetation, with particular focus on maintaining:</p> <ul style="list-style-type: none"> • riparian and wetland vegetation • Banksia woodlands • other vegetation of conservation significance. 	<p>For a licence to be granted:</p> <ul style="list-style-type: none"> • the low-risk indicator for this objective must be met or • supporting information is available which shows that the objective will be met. 	<p>Either:</p> <ul style="list-style-type: none"> • all groundwater-dependent vegetation in the area of predicted drawdown is dependent on another aquifer (Figure 4)¹ or • Predicted drawdown over 10-years is less than the: • 'low risk' drawdown rates and magnitudes (Figure 5b) at all riparian, wetland, Banksia woodland or other vegetation of conservation significance² and • 'medium risk' drawdown rates and magnitudes (Figure 5b) at native vegetation not of conservation significance². 	

¹ Abstraction from the Leederville–Parmelia aquifer may affect groundwater-dependent ecosystems in the Minyulo, Yallalie, Coonderoo and Dalaroo Zones (Figure 4). Abstraction from the Mirrabooka or Surficial aquifers may affect groundwater-dependent ecosystems in the Kardinya Zone (Figure 4).

² Conservation significance and acceptable environmental outcomes determined using provisions and policies of the Environmental Protection Act 1986 and the Environment Protection and Biodiversity Conservation Act 1999.

Jurien plan objective (c): Manage water quality (salinity) of both fresh and saline groundwater resources for fit-for-purpose use.

Licensing objective	Local licensing policies	Low-risk indicator	Examples of supporting information
<p>C1. Protecting the fresh parts of aquifers</p> <p>Objective: Avoid abstraction that will cause intrusion of brackish or saline groundwater into the fresher parts of aquifers.</p>	<ul style="list-style-type: none"> Licences for 50 000–99 999 kL will require salinity monitoring, unless the department's information or the licensee's supporting information shows a low risk of saline intrusion. Licences for 100 000 kL or more will require salinity monitoring and commitments to alter pumping in response to adverse salinity trends, unless the department's information or the licensee's supporting information shows a low risk of saline intrusion. Bores should be constructed to standards outlined in Minimum construction requirements for water bores in Australia, Third Edition³. 	<p>The risk of saline intrusion is best managed through real-time monitoring and response strategies. The department will work with applicants to define adverse salinity trends and appropriate response actions for the operating strategies of licences which pose a risk to this objective, with the following as a guide:</p> <ul style="list-style-type: none"> A 10 per cent increase in salinity will require licensees to investigate the cause, notify the department, and/or monitor more frequently. A 20 per cent increase in salinity will require changes to pumping if abstraction is likely to be the cause. 	<ul style="list-style-type: none"> Other water quality predictions or information that uses sources, methods and parameters endorsed by the department.
<p>C2. Aquifer contamination</p> <p>Objective: Avoid aquifer contamination by nutrients and other pollutants.</p>	<ul style="list-style-type: none"> Licensees will comply with any relevant pollution control provisions of the <i>Environmental Protection Act 1986</i>. Where a legal instrument for pollution control does not apply, the department will encourage good practice in line with existing licensees in Dinner Hill. This may include watertable monitoring bores and water quality analyses. 	<p>Not specified in this statement.</p>	<p>Not applicable.</p>

³ A publication of the National Uniform Drillers Licensing Committee.

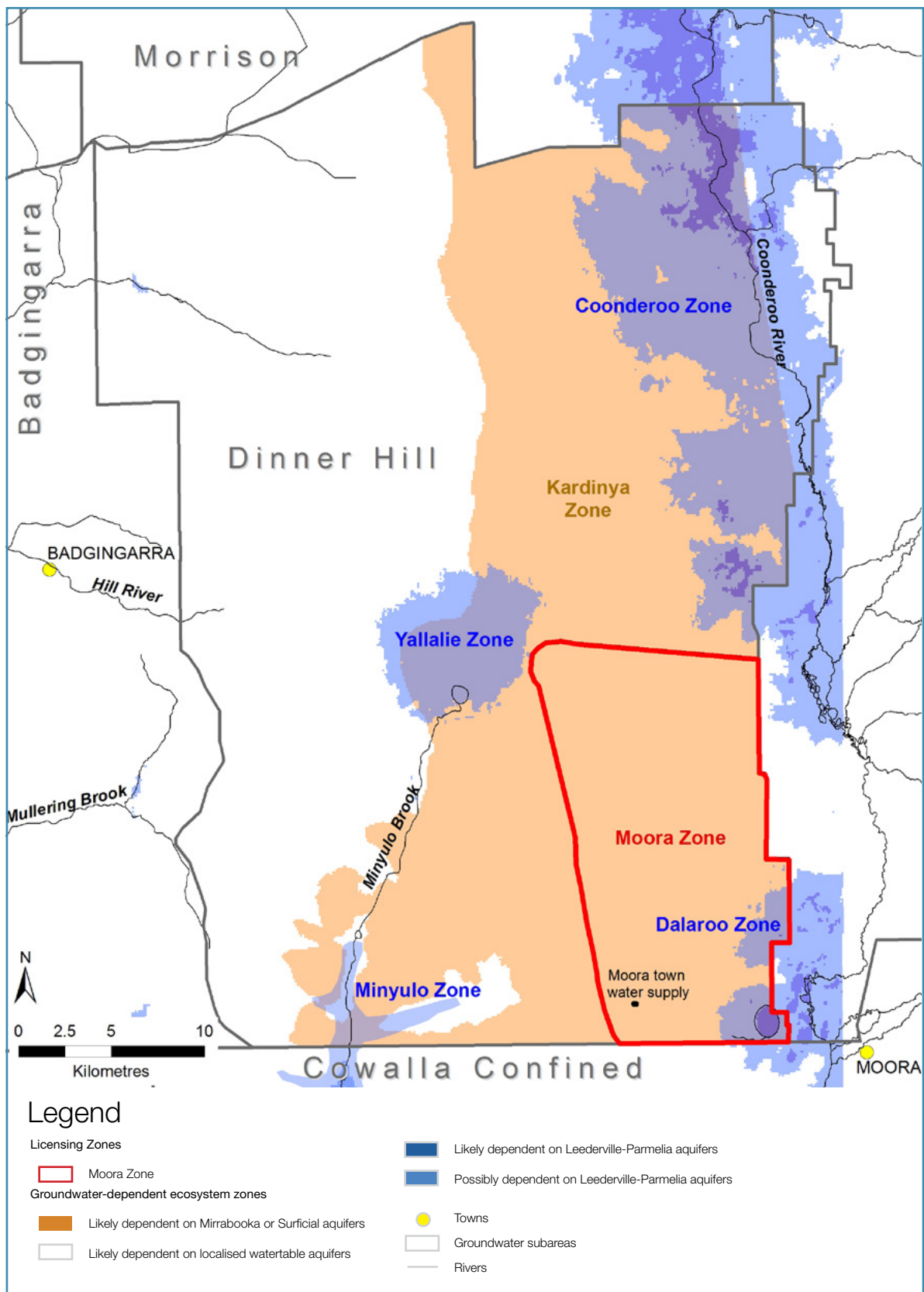


Figure 4: Moora Zone of concentrated abstraction and zones depicting which aquifers may support groundwater-dependent ecosystems

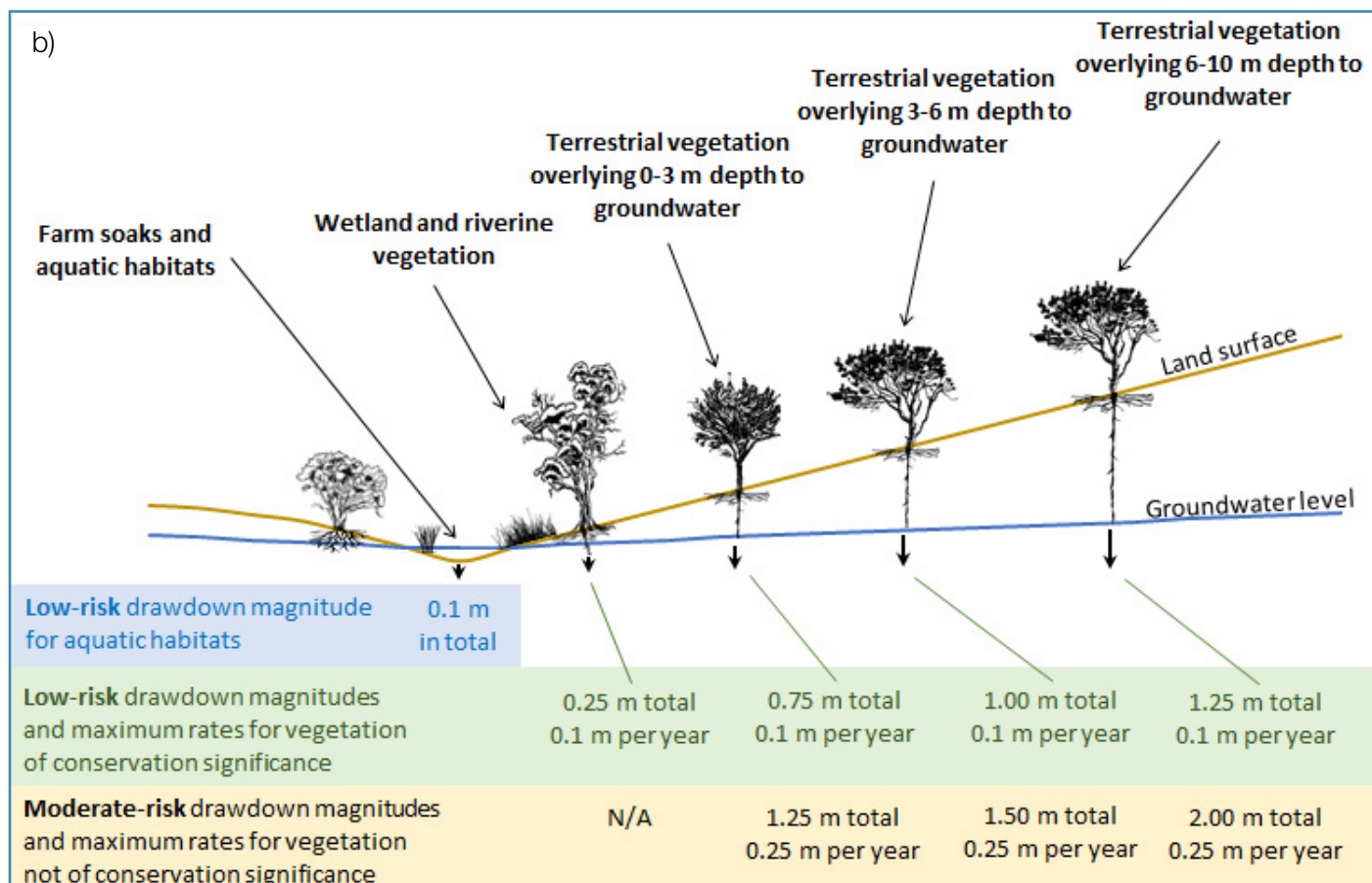
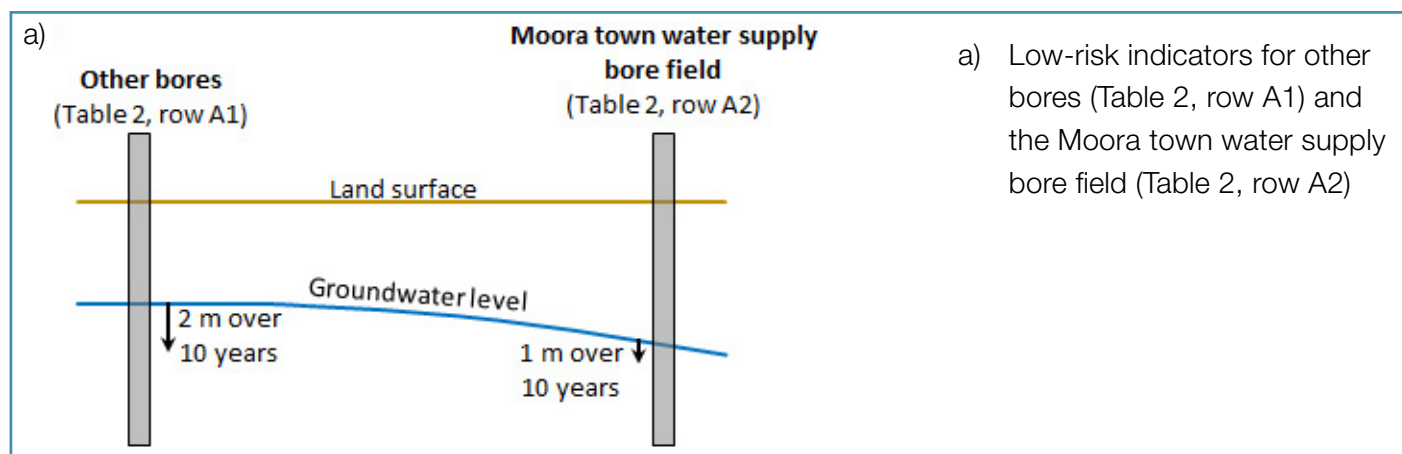


Figure 5: Low-risk indicators for other bores and groundwater-dependent ecosystems



Monitoring and evaluating the resource

Licensees have an important role in collecting data to understand how the aquifer is performing. Water level and salinity data helps licensees make real-time changes to their pumping to protect ongoing viability of their business's water supply. Metering data helps licensees comply with their licence entitlement volume.

Licensee monitoring and metering data are also an essential complement to the department's regional-scale monitoring data, helping us manage the resource for all water users. To interpret how the aquifer is coping with abstraction, we need to know the level of actual water use, and what issues are arising at the local scale.

Two topics of special focus for our future monitoring and evaluation are:

- **Moora Zone** – The department will monitor water levels and quality as licensees reach full use of their entitlements. We will work with licensees and apply existing licensing provisions and policies to ensure sustainability of the Leederville–Parmelia aquifer in this area.
- **Water balance of the Leederville–Parmelia aquifer** – The department will analyse new information from the East Midlands project along with licensee information. We will use our improved understanding of the locations and rates of recharge and discharge in Dinner Hill and Cowalla Confined to further refine how we manage groundwater.

Further information

For further information please contact our Geraldton office on 08 9665 7000 or midwestgascoyne@dwer.wa.gov.au.

You can also view the latest water allocation and availability information through the water register on our website water.wa.gov.au/maps-and-data/maps/water-register.

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