Western Australian water in mining guideline

Draft for public comment

June 2012

Looking after all our water needs
Western Australian water in mining guideline: Draft for public comment

Looking after all our water needs

Department of Water
Water licensing delivery series
Report no. 12
June 2012
Acknowledgements

This guideline forms part of the Water Licensing Delivery series and has been developed in parallel with the Pilbara regional water plan.

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Summary

What is this about?

This guideline sets out how to meet the Department of Water’s regulatory requirements for mining projects. In particular, it draws on the Rights in Water and Irrigation Act 1914, state-wide policies and regional experience in water management issues. The department is also responsible for implementing other water management legislation, including the Country Areas Water Supply Act and the Water Agencies Powers Act, and has responsibility for providing advice to other agencies through its land-use planning process.

The agency has developed this guideline to improve the information available on its regulatory processes. The guide provides advice on water management issues that need to be considered and the type of information the department may require as part of the licence assessment process.

A key objective of this guideline is to ensure mining companies in Western Australia adopt leading-practice water management principles. This guide is not a policy and does not provide an exhaustive list of potential requirements through the assessment process.

While this guideline focuses mostly on groundwater licence applications, most of its processes are applicable to applications for surface water licences.

What is leading-practice water management?

Leading-practice water management is simply the best way of managing water and any associated issues at a given site.

It is as much about a company’s approach and attitude to managing its water resources, as it is about a fixed set of practices or a particular technology.

Leading practice involves developing clear water management objectives for a site, strategies to achieve those objectives, and the set-up of an adaptive management framework that allows the proponent to assess and, where necessary, adjust their site management.

As new challenges emerge, it is critical that companies are flexible and innovative, in developing solutions to match their site-specific requirements.

This guide does not provide a comprehensive coverage of leading practice across all aspects of water management on mines. For these details, refer to the Australian Government Department of Resources, Energy and Tourism guidelines for Leading practice sustainable development program for the mining industry – Water management (2008).
Why are we doing this?

Mining projects can have significant impact on groundwater and surface water resources, and their associated values. Mine operators and developers have asked for clear guidance from Department of Water, the water regulator, to deal with the complexities of water management and the approvals process.

This guideline sets out a flexible process, whereby proponents and the department work together to define what the key issues are, and what information is required for the licence assessment process. The approval requirements for a particular project will vary depending on the local water regime, and the scale and details of the proposed mining operation. Where the impact on groundwater resources is considered to be minor, for example, where saline groundwater use is in low demand, some of the requirements as set out in this guideline will not be necessary.

Where a licence is not required, the same process should be followed, as the department requires the information to provide comments to other agencies. The process outlined in this guideline supports the assessment and issue of instruments under the Rights in Water and Irrigation Act 1914, specifically:

- section 26D licences to construct and alter a well (26D licence)
- section 5C licences to take water and manage its use (5C licence)
- section 11/17/21A permits to interfere with bed and banks (bed and banks permit)

How does this guideline relate to other legislation and policy?

The Rights in Water and Irrigation Act 1914 governs the regulation of water resources in Western Australia. Licences and permits, issued under the Act, are regulatory instruments which define how much water can be taken and management conditions that are required. State-wide policies provide further guidance on specific licensing requirements and, where relevant, are identified through this document. For full details of the policies, refer to the Department of Water website.

The department recognises proponents of mining projects may require approval from a number of government agencies. To reduce duplication, it aligned this guideline with approval processes administered by the Environmental Protection Agency (EPA), the Department of Mines and Petroleum (DMP) and the Department of Environment and Conservation (DEC). The guideline has also been aligned with the Lead Agency Framework, which is administered by DMP, for mining-related projects. The roles of the different agencies are identified in this guide.

In cases where a licence to take water is not required, Department of Water will provide advice to EPA, DEC and DMP, in response to a statutory referral. Where possible, other agencies will place conditions on their regulatory instruments, in regard to water resource management, as recommended by Department of Water.
What regions and projects is this guideline applicable to?

This guideline applies to mining projects in all regions of Western Australia, including (where appropriate) related infrastructure projects such as accommodation, port, road and rail.

It is primarily applicable to new projects but can also be used to guide licence applications for project expansions and mine upgrades. The department may also use the guideline to improve water management at selected sites, when renewing licences or at other selected times.

Licence applicants should note that where there is an allocation plan in place, local water management requirements may apply. Where the impact on groundwater resources is considered to be minor, for example, where saline groundwater use is in low demand, some of the requirements as set out in this guideline will not be necessary. Proponents should contact regional offices for specific local requirements.

Is this guideline consistent with the National Water Initiative?

The overall objective of the National Water Initiative is to achieve a nationally compatible market-, regulatory- and planning-based system of managing water resources and use, one that optimises economic, social and environmental outcomes.

The National Water Commission released a mining position statement in May 2010 outlining its priorities for water reform in the mining industry. Although the Commission’s preference is for mining to be included in broader water markets and water planning processes, such as water trading and allocation plans, it also recognised that in some circumstances inclusion of mining is not always applicable. This is due to the nature of aquifers in many mineral provinces – heterogeneous fractured rock aquifers – and the isolation of mining projects and lack of competition for water resources. These circumstances are particularly applicable to the large mineral provinces of Western Australia.

This guideline is therefore a key part of the department’s response to planning for mining projects, in that it provides for a consistent and transparent framework for assessing mine water requirements and management across the state. It also provides for statutory-based planning through its links with water licensing.

What does the guideline include?

The guideline covers a six-stage process:

A  Preliminary consultation
B  Scoping the water management task
C Water Licence application and EPA assessment
D Licence assessment
E Construction and operation
F Decommissioning and closure

Detailed information about each stage can be found in section 3 of this guideline.

The guideline also includes the relevant departmental policies to consider when applying for a water licence. These are included throughout section 3 and section 4, where specific policies for mining in Western Australia are also included.

How did the Department of Water develop this guideline?

This guideline has been adapted from the *Pilbara water in mining guideline* (2009), which had undergone a consultation process with regional stakeholders and was widely accepted.

The Department of Water worked with the mining industry to develop the original Pilbara guideline and ensure its usability. This document has only had minor changes to allow it to be applicable state-wide and, therefore, only minimal further consultation was conducted.

Application of this guideline may vary in different regions. Where the impact on groundwater resources is considered to be minor, for example, where saline groundwater use is in low demand, some of the requirements as set out in this guideline will not be necessary.
Invitation to make a submission

The Department of Water welcomes any comments you may wish to make on the draft guideline.

When making a submission, it would be helpful if you include details such as the chapter, page number or action number to which each comment relates. If you would like your submission and identity to remain confidential, clearly print on the top of each page of your submission the word 'confidential'. All submissions will be considered and a statement of response will be issued by the department.

Please send your submissions to:

Regulation Division
Department of Water
PO Box K822
PERTH WA 6842

Or email us at regulation@water.wa.gov.au

The draft plan is now available for public comment. Please send your comments by 5 pm, Monday 6 August 2012.

After the end of the consultation period, the Department of Water will consider all submissions when it prepares the final guideline.

For more information about this guide, contact:

John Connolly, Director, Regulation division – 08 6364 7600
Jade Gorton, Manager Regulatory Operations Support, Regulation division - 08 6364 7600
Kimberley region, Kununurra – 08 9166 4100
Pilbara Region, Karratha – 08 9144 0200
Midwest–Gascoyne region, Geraldton – 08 9965 7400
Midwest–Gascoyne region, Carnarvon – 08 9941 6100
Swan Avon and Goldfields region, Perth – 08 6250 8000
South-West region, Bunbury – 08 9726 4111
Kwinana-Peel region, Mandurah – 08 9550 4222
South Coast region, Albany – 08 9842 5760
1 Objectives for the guideline

The Department of Water is seeking to achieve the following objectives, outlined below, through the implementation of this guideline.

1.1 Guideline objectives

- Provide clear guidance to proponents of the department’s Rights in Water and Irrigation Act 1914 approval process.
- Develop a consultative and cooperative relationship between regulator and proponents.
- Facilitate early identification of water management issues.
- Clearly define water management objectives, and do so early on.
- Clearly outline the information requirements for assessment.
- Facilitate development of an adaptive management framework that meets water management and regulatory requirements.
- Emphasise the life-of-mine approach to water management.

1.2 Mine water management objectives

The department’s objectives for mine water management are to:

- minimise the adverse effects of the abstraction and release of water on environmental, social and cultural values
- ensure mining activity does not adversely affect the quality and quantity of public-and-private drinking water supplies
- ensure all possible water sources are considered when planning water supply for mining operations
- ensure high-quality water is used only in situations where it is essential or no other suitable water source is available
- ensure high-value use by industry, with the fewest adverse effects
- maximise water-use efficiency at all mine sites, particularly water-deficit sites, to reduce the need for water to be abstracted from the environment
- optimise the use of mine dewatering surplus on-site, to reduce the effects of releases to the environment
- ensure the cumulative effects of individual mining operations are considered and managed
- ensure water management planning includes consideration of mine voids after mining operations cease
- use a monitoring and evaluation process, to adaptively manage the effects of abstractions and releases on the water regime
• maximise cooperation, in water management activities, between mining operations, to reduce the impact on the environment
• develop and maintain positive relationships between stakeholders so information needed to properly manage water resources is shared
• plan for, and manage, the effects of a highly variable climate.
2 How to use the guideline

The guideline is structured with five stages to match the mine life cycle. These are summarised below. Section 3 contains the details of each stage.

Department of Water has also aligned this guideline with the requirements and approval processes of other government agencies, including those of the DMP, DEC and EPA.

Stage A — Preliminary consultation

In Stage A the proponent provides an outline of the development concept to the department. The proponent needs to include a summary of water requirements, major water management issues and an indicative water balance. During this stage an important working relationship is established between the proponents and the department, which supports approvals and ongoing management needs.

Stages A and B occur in the pre-feasibility stage of project development and may require a referral to the EPA. At this stage proponents should also meet with representatives of other regulatory agencies to determine their approval and information requirements.

The EPA report *General guide on referral of proposals to the Environmental Protection Authority under section 38 of the Environmental Protection Act* will assist proponents in determining whether or not their proposal should be referred to the EPA. Department of Water will encourage proponents to self-refer their proposal to the EPA but in some circumstances, the department may refer the proposal if it believes the project is likely to have a significant effect on the environment.

Stage B — Scoping the water management task

In Stage B the proponent and the department define regulatory requirements for the proposed project, and confirm the scope of studies and investigations to support the application for a 5C licence and provide baseline information. The information to be gathered should allow the proponent to develop adequate management arrangements to address any of the identified water-related issues, and provide sufficient information for the department to conduct a thorough assessment of the impacts on taking and using water. It would also provide a future baseline for comparison.

The output of this stage is an agreed scope of regulatory requirements and supporting information, between the proponent and the department. This may also include providing information about issues not directly related to water resource management, including socio-economic factors.

Stage B corresponds with the scoping phase of the EPA’s environmental impact assessment process and approvals required by other government agencies.
Stage C — Water licence application and EPA assessment

In Stage C the proponent conducts the studies and investigations agreed in Stage B. The proponent then prepares and submits an application for a 5C licence, if necessary.

If the proposal is submitted to the EPA, the authority is likely to request a water management plan. If not, a water management plan may be requested by the department, in support of the licence application. It should be noted a water management plan is not a mandatory requirement of a 5C licence assessment. However, a water management plan will assist Department of Water, DEC and DMP as the agencies assess the proposal.

Stage C marks the beginning of the formal assessment process for a 5C licence under the Rights in Water and Irrigation Act 19141. At this stage the Department of Water also provides input into the EPA assessment process. The department will align assessment for a water licence application with the relevant agencies (DEC and DMP), where there are shared water-related issues.

Stage D — Development of an operating strategy and final licence decision

In Stage D the proponent prepares and submits an operating strategy, setting out in detail how it will manage water over the life of the project. Other information may also be required to support the assessment, including hydrogeological reports and flood management plans.

Department of Water finalises assessment of the 5C application, with consideration to the supporting information, including the operating strategy, and negotiates changes with the proponent as necessary.

The output of this stage is a water licence which includes an operating strategy and licence conditions.

Stage E — Construction and operation

In Stage E the proponent manages its taking and use of water, in accordance with the approved operating strategy and other licence conditions. The proponent is responsible for managing water-take and use, as per the licence, throughout the life of the mine. This will typically involve regularly reporting to the department and using adaptive management practices.

Stage F — Decommissioning and closure

In Stage F the proponent begins planning for the scale-down of operations for the eventual closure and decommissioning of the site. The proponent is responsible for
managing the long-term impacts of its operations to the surrounding water resources and environment.

The DMP Guidelines for preparing mine closure plans, released in June 2011, will assist proponents in considering all aspects of the operations in their closure management.

Policies for water allocation and use

Policies are set by the department to ensure that available water is allocated and used consistently and in accordance with the Rights in Water and Irrigation Act 1914. Policies provide a structure for assessing licence applications and setting conditions. In this guideline, we have provided policies which are relevant to the mining industry.
3 The guideline

The six-stage process defined in this guideline is represented and summarised in Figure 1. The figure displays inputs and outputs, and includes the role of Department of Water during the various stages of the process. The stages are listed down the left side of the diagram, while the inputs, outputs and the role of the department, relevant to each stage, are listed across the top of Figure 1.
Figure 1: Summary process flow chart

**Stage A: Preliminary Consultation**
- Proponent prepares outline of proposal and consults with Department to determine complexity of water issues
- Conceptual water balance

**Stage B: Scoping the Water Management Task**
- Proponent and agencies to scope the assessment requirements and timetable
- Applications for 26D licence

**Stage C: Water Licence Application and Environmental Protection Agency Assessment**
- Proponent conducts agreed investigations and prepares appropriate hydrogeological assessment documents
  - Application for 5C licence
  - Submits Water Management Plan (where required)
- Proponent responds to submissions, undertakes assessment

**Stage D: Development of an Operating Strategy and Final Licence Decision**
- Draft Operating Strategy based on Water Management Plan
- Finalise any additional work required

**Stage E: Construction and Operation**
- Licensee provides monitoring reports and other information as required, during the term of the licence, conditions and commitments of the operating strategy
- Confirm and improve management with evaluation of goals and targets with monitoring, reporting and taking action

**Stage F: Decommissioning and Closure**
- Proponent submits a mine closure plan in accordance with Department of Mines and Petroleum guidelines
- Makes recommendations to Department of Mines and Petroleum/Environmental Protection Agency about ongoing monitoring and reporting commitments

**Outputs**
- Identification and shared understanding of any critical issues that may affect approval of the project
- Agreed scope of regulatory requirements and information needs for a licence application
- 26D licence granted subject to assessment and conditions
- Finalised hydrogeological/hydrological report detailing water availability
- Development of the conceptual water balance that mirrors knowledge of the water systems and use
- Finalised Water Management Plan (either as a requirement of the Environmental Protection Agency approves process or the Department's request)

**Inputs**
- Provides information available on the complexity of water issues, availability and known impacts within the area in response to proponent's outline of proposal
- Provides advice and guidelines to the proponent to help determine the scope of assessment, what information will need to be supplied to the department for assessment and preliminary advice on what water management objectives may be
- Assessment of 26D licence applications
- Assesses the proponent's application documents including hydrogeological/hydrological reports and the Draft Water Management Plan
- Provides advice to Environmental Protection Agency, other government agencies and advises proponent with some direction if further work is required
- Assesses licence application and Draft Operating Strategy
- Decides on appropriate terms and conditions for licence after considering hydrogeological/hydrological reports, environmental information and other approvals including alignment to Environmental Protection Agency recommendations and environmental conditions

**Department of Water**
- Ongoing assessment of monitoring and reporting commitments made within the operating strategy to ensure adaptive management
- Regulation as per conditions of the licence – includes licence inspections/audits
- Leading practice water management
- Management of impacts beyond the life of the mine
3.1 Stage A — Preliminary consultation

In Stage A the proponent needs to consider each of the water management components for the mining operation that are listed in Table 1. The purpose of this stage is for proponents and Department of Water to establish a common understanding of the project’s water requirements and challenges. The two parties will also identify critical issues that may prevent a water licence being granted. Key considerations at this stage include identifying the:

- regulatory requirements for abstracting and using water, including whether a staged approach to approvals will be necessary
- water volume and quality needs of the proposed operation
- possible sources of water, and their quantity and quality
- legal requirements for access to water sources
- management of dewatering volumes and use of surplus
- broad ecological, social and cultural values that may be impacted by water abstraction and use as well as other local water users
- need for efficient use of water.

Proponents should liaise with all relevant approvals agencies at this stage. This will reduce duplication where similar information is required and therefore ensure the approvals process runs well.

Stage A input

The input for this preliminary consultation stage is a description of the proposed project, including an initial conceptual water balance (for example, see Figure 2). The project description is similar to an EPA referral which is described at the EPA website.

Stage A output

An output of the preliminary stage is the proponent’s conceptual water balance, detailing whether the mine will be a net user or net producer of water. Critical issues, and proponent awareness of water regulation relevant to the project, will be indentified.
### Table 1 Preliminary consultation guideline

<table>
<thead>
<tr>
<th>Component</th>
<th>Preliminary consultation</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.1 Water demands</td>
<td>Consider the potential water demands for the project, including at the mine, and for supporting infrastructure such as port, rail and accommodation facilities. Consider: • intended scale • estimates of water use • staged development.</td>
</tr>
<tr>
<td>A.2 Fit for purpose</td>
<td>Consider the potential water quality requirements for the project including at the mine and for supporting infrastructure such as port, rail and accommodation facilities. Consider options for: • recycled water • non-potable water • lower-quality water.</td>
</tr>
<tr>
<td>A.3 Water source options</td>
<td>Consider the project's potential water sources, and their quantity and quality, for mine, rail and port operations. Options include: • groundwater • surface water • recycled or reused water • surplus water (for example, from dewatering) • third-party supply (from other mine operations) • desalination • scheme water supply • local or remote supply • a combination of the above.</td>
</tr>
<tr>
<td>A.4 Water access options</td>
<td>Consider the legal requirements for access to each water source option. Consider: • access to the land • public drinking water source areas • Native Title Act 1993 requirements • High-value ecological and cultural assets, and wetlands • other mining tenements • pastoral leases.</td>
</tr>
<tr>
<td>Component</td>
<td>Preliminary consultation</td>
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<tr>
<td>A.5</td>
<td>Water-dependent ecosystems Consider the water-dependent ecosystems within the project area. This includes but is not limited to: • riparian zones • high-value vegetation areas • wetlands and river pools • water-dependent fauna and flora.</td>
</tr>
<tr>
<td>A.6</td>
<td>Other water-dependent values Consider the water-dependent cultural and social values within the project area, including the need for consultation to identify relevant sites. This includes but is not limited to: • indigenous values • other water users and industries.</td>
</tr>
<tr>
<td>A.7</td>
<td>Risk to water-dependent values (particularly critical ones that may result in the project not being approved) Consider the range of potential risks to the water resource and dependent values. Consider: • drawdown impacts (changes in water level) • water quality impacts • through-flow impacts • discharge impacts.</td>
</tr>
<tr>
<td>A.8</td>
<td>Cumulative impacts Consider the potential cumulative impacts of the proposed project and other operations. Consider: • other operations within the catchment • other abstracters in the area • proposed operations within the catchment • opportunities for cooperation.</td>
</tr>
<tr>
<td>A.9</td>
<td>Baseline information Consider what information is already available in the area (all sources), to use as baseline data, and identify critical information gaps. Consider: • existing hydrological and hydrogeological information • existing environmental, social and cultural information • meteorological data • drilling information.</td>
</tr>
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</table>
## Preliminary consultation

<table>
<thead>
<tr>
<th>Component</th>
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</table>
| **A.10** Water balance                 | Consider the likely balance of water use and potential water supply, at a conceptual level. Consider:  
• major water uses  
• supply options. |
| **A.11** Allocation plans (Department of Water) | For areas where allocation plans have been developed, refer to them for information about water allocation and local licensing policies. Allocation plans are available at the department’s website and further information can be attained from the appropriate regional office. |
| **A.12** Other regulatory agencies     | Identify what issues are to be dealt with by the department and what are the responsibilities of other agencies. Consider the role of the:  
• Office of the Environmental Protection Authority  
• Department of State Development  
• Department of Mines and Petroleum  
• Department of Environment and Conservation  
• Department of Indigenous Affairs  
• Department of Agriculture and Food (Pastoral Lands Board). |
| **A.13** Stakeholder consultation      | Identify any critical stakeholders for consultation Consider:  
• community groups  
• local water users (other mines or different industries)  
• Indigenous groups. |
| **A.14** Staged development            | Depending on the nature of the development, determine whether a staged approach to information collection and approvals is necessary. Consider:  
• longevity of operation and project schedule  
• information requirements  
• *Statewide policy no. 9 – Water licensing – Staged developments.* |

### Example of a conceptual water balance

The following example of a conceptual water balance indicates the level of detail needed at Stage A of the project development process. The proponent also needs to classify the predicted water balance into one of the following general water demand categories:

- **significant deficit**: demand much greater than extractive requirement
- **deficit**: demand greater than extractive requirement
- **neutral**: demand equals extractive requirement
• surplus demand less than extractive requirement
• significant surplus demand much less than extractive requirement

![Diagram of water balance](image)

Figure 2 Example conceptual water balance for a below-watertable operation — showing principal water source and uses.

3.2 Stage B — Scoping the water management task (Resource evaluation and assessment)

In Stage B the proponent works with Department of Water and other relevant agencies, to determine the scope of hydrogeological or hydrological assessment needed to support a 5C licence application, as per Operational policy no. 5.12 – Hydrogeological reporting associated with a groundwater well licence.

Proponents taking a thorough approach to the scoping stage reduce the risk of delay in the assessment phase, caused by missing or inappropriate information. The information to be investigated by the proponent, through its hydrogeological assessment and investigative work, is detailed in Table 2.

The hydrogeological assessment and any additional investigations should be broadly targeted around:
• understanding the water resource and regime, and potential impacts of the project on the resource the environment and other water users for the life of the mine
• potential for re-injection, if required
• establishing baseline information to be used for future assessment of changes
• informing management strategies such as monitoring and contingencies
• constructing a hydrogeological model, where required.

At the end of Stage B the proponent understands the investigations to be undertaken and the timelines for their completion. Stage B corresponds with the scoping phase of the EPA environmental impact assessment process, and any investigative work for the department should be aligned with the requirements of other regulatory agencies. This will eliminate overlap and duplications.
The proponent may also need to lodge one or more applications for 26D licences to allow the commencement of drilling for investigative purposes. Bed and banks permits and small-scale water abstraction licences (e.g. for construction or accommodation) may also be required at this stage. Depending on the size and nature of the proposed development, the proponent and the department might agree to take a staged approach to approvals. The agency will identify what investigations are necessary to proceed through the approvals process and which ones can be considered on an ongoing basis. The process for staged developments is outlined in Statewide Policy no. 9 – Water licensing – Staged developments.

Stage B input

The proponent should present all information that is available, regarding water resources and the critical issues identified in Stage A.

Stage B output

Agreement should be reached between the proponent and the department on the level of hydrogeological assessment and other investigations required, with a timeline for completion of these investigations and a predicted water balance.

Table 2  Project scoping guideline

<table>
<thead>
<tr>
<th>Component</th>
<th>Project scoping</th>
</tr>
</thead>
</table>
| **B.1 Water access**             | Investigate the access options for all water infrastructure at mine, port and rail operations. Consider:  
|                                  | • points of abstraction  
|                                  | • infrastructure pathways (pipeline and road impact on streams)  
|                                  | • taking of water in water source protection areas  
|                                  | • land access  
|                                  | • national parks or other estate  
|                                  | • potential monitoring sites  
|                                  | • public drinking water source areas  
|                                  | • native title areas (claims and determinations).  
| **B.2 Exploration for water sources** | Assess requirements for a 26D licence. A licence is required for:  
|                                  | • constructing a bore or well (except for non-artesian monitoring bores)  
|                                  | • altering a bore or well (except for non-artesian monitoring bores)  
|                                  | • constructing bores for re-injection purposes.  

<table>
<thead>
<tr>
<th>Component</th>
<th>Project scoping</th>
</tr>
</thead>
</table>
| B.3 Water source   | Investigate the sustainability of the water-source options at mine, rail and port operations.  
Consider:  
- local and regional hydrogeology and hydrology of sources  
- groundwater and surface water connectivity  
- recharge  
- reliability  
- water quality  
- impacts of abstraction regimes, including on existing use such as for community water supply and stock bores  
- minimisation of impacts  
- regulatory requirements for abstraction  
- Requirements of Operational Policy 5.12 – Hydrogeological reporting associated with a groundwater well licence.                                                                                                                                                                                                                                                                                  |
| B.4 Fit-for-purpose water use | Investigate lower-quality water-use options for mine, rail and port operations.  
Consider:  
- minimum standards of water quality for different purposes  
- infrastructure changes that could allow the use of lower-quality water  
- benefits such as security of supply and avoidance of adverse effects at other sources  
- the availability of water  
- Refer to Operational Policy 1.02 – Policy on water conservation/efficiency plans – Achieving water use efficiency gains through water licensing  
Also refer to policy 7.2 – Fit for purpose, in section 4 of this document.                                                                                                                                                                                                                                                                                             |
| B.5 Alternative sources | Investigate alternatives to the traditional surface and groundwater sources.  
Consider:  
- recycled water opportunities at all stages of the operation  
- suitability of non-potable supplies  
- possible provision by a third party (refer to policy 5.4 Allocation of dewater release, section 4)  
- trading options, as per Operational policy no. 5.13 – Water entitlement transactions for Western Australia  
<table>
<thead>
<tr>
<th>Component</th>
<th>Project scoping</th>
</tr>
</thead>
</table>
| B.6 Dewatering                    | Investigate dewatering needs for mining below the watertable, if applicable.                                                                                           Consider:  
  • impacts of abstraction regimes, including on existing users such as community water supply and stock bores  
  • local and regional hydrogeology-and-hydrology of sources  
  • groundwater and surface water connectivity  
  • minimisation of impacts  
Also refer to policy 5 Dewatering and excess water management, in section 4. |
| B.7 Optimising water use          | Investigate water optimisation options for mines, with surplus water from dewatering.                                                                                   Consider:  
  • efficient on-site use (including processing and dust suppression)  
  • opportunities for supply to a third party  
  • aquifer re-injection, including suitability of the receiving aquifer  
Also refer to policy 7.1 – Water use efficiency and optimisation of water at site, in section 4. |
| B.8 Water-use efficiency          | Investigate infrastructure methods to achieve water-use efficiency.                                                                                                       Consider:  
  • major infrastructure options  
  • phasing of different water use activities  
  • engineering alternatives  
  • alternative bore field configurations to minimise water wastage  
  • minimising water use for dust suppression  
  • use of mine voids for water storage  
  • Refer to Operational policy 1.02 – Policy on water conservation/efficiency plans: achieving water use efficiency gains through water licensing. |
| B.9 Integrated water management   | Investigate the opportunities for integrated water management across operations at:  
  • port operations  
  • rail operations  
  • mine operations  
  • other supporting infrastructure. |
<table>
<thead>
<tr>
<th>Component</th>
<th>Project scoping</th>
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</table>
| **B.10** Water-dependent ecosystems | Investigate the occurrence and function of water-dependent ecosystems.  
Consider:  
- identification of any water-dependent ecosystems  
- connectivity of water-dependent ecosystems to water resources  
- sensitivity to water-level change  
- water-level requirements  
- flood and cyclonic impacts  
- consultation requirements  
- ecological water requirements. |
| **B.11** Other water-dependent values | Investigate the occurrence and distribution of other water-dependent values.  
Consider:  
- identification of cultural and social sites and values (a socio-economic study may be required)  
- any consultation required to identify the specific cultural and social values  
- water levels or flows required to maintain those values. |
| **B.12** Water quality impacts | Investigate the potential impacts of operations on water quality.  
Consider:  
- any presence of acid-forming material  
- tailings facility design and management  
- in situ leaching design  
- baseline water quality of receiving water bodies  
- turbidity, salinity and acidity impacts  
- buffering and mitigation capacity of water bodies that receive acid water  
- impact of salinity on non-potable water use  
- designing baseline monitoring programs  
- defining water quality triggers for operations and emergencies  
- ANZECC guideline for water quality during operations  
Water quality protection notes are also available at the department website and provide information about how to protect water quality.  
Note that DEC is the primary regulatory agency for point source pollution and contaminated sites, through its administration of the *Environmental Protection Act 1986* and the *Contaminated Sites Act 2003*. |
<table>
<thead>
<tr>
<th>Component</th>
<th>Project scoping</th>
</tr>
</thead>
</table>
| B.13 Water-release options | Investigate the options for release of mine surplus water. Investigations need to consider: • re-use on site • relocation for use nearby • aquifer pit storage • sub-surface reticulation • controlled discharge • uncontrolled discharge • catchment or aquifer modification • stream realignment  
Policy 5.2 – Use and release of water, in section 4, provides further guidance regarding the preferred options for surplus water use or discharge.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| B.14 Releasing water | Investigate the potential impacts of releasing water to the environment. Consider: • likely releases • receiving-water-points water regime • changes in water-release regime throughout the life of the project • ecosystem impacts • likely stream morphology changes • seasonal changes • flood events • sensitivity of receiving water-dependent environment • scale of impact downstream • cultural and social impacts of release, and Aboriginal Heritage Act 1978 legal requirements  
DEC regulates dewatering discharge through the licensing provisions of the Environmental Protection Act 1986.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| B.15 Cumulative impacts | Investigate the potential scale of cumulative impacts on the water regime that may occur as a result of the project. Consider: • multiple areas of potential abstraction • overlapping cones of drawdown • dewatering discharge locations • distribution of ecosystems within the project area • catchment-scale groundwater levels • alternatives to avoid or manage the cumulative impacts  
Also refer to policy 10 – Cumulative impacts, in section 4.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
Investigate the consequences of various post-closure water management options. Consider:
- backfilling to watertable
- regional aquifer and hydraulic connections
- potential salinity impacts of mine void
- rehabilitation water requirements and duration
- catchment scale and temporal outcomes
- rehabilitation or reconstruction of surface water features

Also refer to policy 6 – Mine closure, in section 4.

Develop a predicted water balance, showing major uses and sources of water. The water balance needs to include the predicted volume of water:
- needs, at a coarse scale
- required from available sources, at a coarse scale.

**Figure 3**  *A predicted water balance for a below-watertable operation, showing major sources and uses of water, including estimated volumes.*

### 3.3 Stage C – Water licence application and EPA assessment

In Stage C the proponent conducts the hydrogeological assessment and other investigations agreed to in Stage B. Following the completion of these studies, the proponents submit an application for a 5C licence, supported with all relevant documentation to the Department of Water.
A water management plan may also be requested by the department, in support of the licence application, if:

- the project has complex water requirements across the life of the mine
- it is required by the EPA or other regulatory agencies
- the proponent wishes to adopt leading-practice water management.

It should be noted that a water management plan is not a mandatory requirement of the 5C licence assessment. However, there are benefits for both the proponent and the department, in preparing a water management plan, including:

- it provides a consolidated and broad outline of the water management approach for the life of the project, including any regulatory requirements or commitments
- water management objectives are communicated
- adaptive management mechanisms, including trigger, response and contingencies, and the reasons for them, are outlined
- background information is provided, which can be used for the development of an operating strategy that may be required in Stage 4

Where the EPA requires the proponent to submit a water management plan, the department will align its assessment processes.

In some circumstances, the department may not request preparation of a water management plan. However, the proponent needs to ensure that it is clear in the hydrogeological assessment or draft operating strategy (to be completed in Stage 4) what the water management objectives are and how water resources will be managed over the life of the project. Table 3 provides a checklist of issues to be considered by the proponent and documented at this stage of the process.

Stage C marks the beginning of the formal assessment process for a 5C licence under the Rights and Water Irrigation Act 1914, and proponents will need to submit a valid application at, or before this stage. Applications for a 5C licence that do not meet departmental requirements cannot be approved and the agency may ask proponents for further information, reject their applications or return them after sufficient information was not supplied. Refer to Operational policy no. 5.11 – Timely submission of required further information.

Proponents can reduce the risk of delay or non-approval of projects through engaging with the department throughout stages A and B, and following this guideline.

Applications for 26D licences, bed and banks permits and preliminary water abstraction licences (associated with investigations and infrastructure setup) will continue to be considered and assessed as required.

**Stage C input**

Input to this stage includes the outputs of the investigations agreed in Stage B, a 5C licence application and, where requested, a water management plan.
Stage C output

The output is an endorsed water management plan (if required) and confirmation by the department that sufficient information has been supplied to conduct an adequate licence assessment.

Table 3  Guideline for the water management plan, if requested

<table>
<thead>
<tr>
<th>Component</th>
<th>Development of a water management plan</th>
</tr>
</thead>
</table>
| C.1 Adaptive management framework | Describe the adaptive management framework that will operate at the mine:  
• What are water management objectives of the project?  
• What are the regulatory conditions/requirements that need to be met?  
• What are the strategies for achieving the water management objectives?  
• How are you going to measure whether the water management objectives are being met?  
• What contingency plans are in place?  
• How and when will the water management objectives be evaluated? |
| C.2 Water sources           | Describe and justify the water supplies chosen for the life of the project for consideration in a future operating strategy.  
The description needs to include:  
• longevity of the sources  
• site-specific water constraints (the environment, cultural values and other users)  
• variability of the sources  
• reliability (quality and quantity), given process needs and variability of supply  
• identify and assess benefits and impacts of using the chosen source. |
| C.3 Abstraction             | State the abstraction volumes and pumping rates required to supply the operation for the life of the project, including dewatering abstraction.  
The description needs to include pumping rates and volumes, and the expected duration of pumping, for:  
• the initial construction of the mine  
• the operating life of the mine (including anticipated expansions)  
• after-closure requirements. |
## Component: Fit-for-purpose water use

**Development of a water management plan**

Describe how the operator will ensure the quality of water to be used for different aspects of the operation will be appropriate to the needs of those aspects.

The description needs to include:

- the quality needs of each purpose
- the sources chosen to meet those needs
- specific justifications for any proposed use of potable water for purposes that need only low-quality water.

## Component: Water-dependent ecosystems

**Development of a water management plan**

Describe the likely impacts on water-dependent ecosystems for the life of mine and how they will be managed.

The goals for managing water-dependent ecosystems within the area of influence of the operation are to:

- minimise the impact on regionally significant wetlands
- maintain good water quality, and healthy riparian and aquatic flora-and-fauna in permanent pools
- prevent the spread of weeds into downstream environments, through changes to the water regime.

The description of impacts needs to include:

- the ecological water requirements for each site where environmental impacts are caused by abstraction or use of water
- a description of the process used to define the ecological water requirement
- identification of ecosystems where it is expected the ecological water requirements will not be met.

It needs to include management techniques for unavoidable impacts on:

- permanent pools
- naturally occurring water bodies.

If it is expected it will not be feasible to minimise a particular impact, then the following needs to be explained:

- the location of the impact
- the reasons why it will not be feasible to minimise it
- what offsets or other activities will be implemented to ensure a net benefit to water-dependent ecosystems.
<table>
<thead>
<tr>
<th>Component</th>
<th>Development of a water management plan</th>
</tr>
</thead>
</table>
| C.6       | Water-dependent social and cultural values | Describe the likely impacts on any water-dependent cultural or social values for the life of the mine. The description needs to include:  
• the water needs for each site, where cultural and social values are likely to be affected by the mining operation  
• how the water requirements were defined, including through consultation  
• identification of any sites where the water needs for maintaining cultural or social values are not expected to be met  
• ways of managing unavoidable impacts  
• any agreements reached with the local communities on acceptable impacts.  
If it is expected that it will not be feasible to minimise a particular impact, then the following needs to be explained:  
• the location of the impact  
• the reasons why it will not be feasible to minimise it  
• what offsets or other activities will be implemented to ensure a net benefit to water-dependent cultural or social values.  
Note, approval under the *Aboriginal Heritage Act 1978* is required before a heritage site can be disturbed. |
| C.7       | Water quality | Describe the proposed methods for managing any possible effects on water quality of the source and aquifer during the life of the mine, during the closure process and after the operation is closed. The description needs to include management of:  
• water-dependent ecosystems  
• water storage management  
• discharges of water  
• areas that may produce acid rock drainage  
• public drinking water source areas  
• salinity. |
| C.8       | Use and release of excess water | Describe and justify the options chosen for the release or re-injection of water at water surplus mines. The description needs to include:  
• site-scale management regime  
• catchment scale management regime  
• management outcomes agreed with the department  
• potential impacts. |
<table>
<thead>
<tr>
<th>Component</th>
<th>Development of a water management plan</th>
</tr>
</thead>
</table>
| C.9 Water-use efficiency      | Describe the mechanisms proposed for maximising the efficiency of water-use efficiency in mine, rail and port operations. Give the reasons for the choices and state the targets chosen for efficiency of water use in these operations.  

The description of targets needs to include:  
• baseline water demand at each point of operation  
• measures implemented to reach targets  
• measures not used and why  
• forecast water use after measures applied  
• targets for improved efficiency.  

Note that where additional groundwater supplies are required, evidence of efficient water use will need to be provided. |
| C.10 Cumulative impacts        | Describe the measures taken to manage cumulative impacts to the water regime.  

The description needs to include:  
• changes from previous resource targets for areas of cumulative impact  
• individual arrangements for addressing any cumulative impacts  
• cooperative arrangements with other mines that are likely to have an impact on the water regime. |
| C.11 Interference with stream beds and banks | Identify where interference to bed and banks of watercourses by either infrastructure or operations will occur. These situations will need a Section 11/17/21A permit to interfere with bed and banks.  

The permit requirements include a description of the proposed techniques for minimising disturbance to riparian areas. These include:  
• consolidation of infrastructure, requiring a creek crossing with existing creek-crossing alignments or previously disturbed areas  
• avoidance of high-velocity sections and bends on the watercourse  
• use of best practice rehabilitation and bank stabilisation techniques.  

The permit requirements also include a statement of:  
• possible changes to flow in the watercourse during the life of the mine  
• where exemption to vegetation-clearing regulations may be required. |
<table>
<thead>
<tr>
<th>Component</th>
<th>Development of a water management plan</th>
</tr>
</thead>
</table>
| C.12 Post-closure management | Describe the mechanisms proposed for managing the long term, after-closure changes to the water regime that result from the mine operations. The description needs to include:  
- a prediction of changes in water quality of any planned pit lake over time  
- a prediction of long-term impact on downstream water quality and flow regimes from modifications to surface water features  
- a water resource condition objective for mine closure for the affected water regime  
- a proposed monitoring program to check the predicted trends  
- future re-use options for water storage facilities  
- containment of tailings. |
| C.13 Water balance | Describe the estimated water balance. The description needs to include identification of all:  
- water uses and associated volumes  
- water sources and associated volumes. |

**Figure 4** Example of a Stage C water balance which shows the sources and uses of water, including estimated volumes in megalitres
3.4 Stage D – Development of an operating strategy and final licence decision

In Stage D the proponent prepares and submits an operating strategy, based on the water management plan (where requested) and the information submitted with the licence application.

The operating strategy sets out in detail how the proponent will manage water over the life of the project. It differs from the plan in that it is operational and legally enforceable through licence conditions. The operating strategy needs to include a detailed water balance.

*Operational policy 5.08 – Use of operating strategies in the water licensing process* provides a guideline for preparing an operating strategy, and guidance on how to apply this to mining activities is documented in Table 4.

The Department of Water will assess the proponent’s draft operating strategy to ensure it is adequate, and may negotiate changes where necessary. The operating strategy must also include an adaptive management framework, with the proponent using the results of its monitoring program to continually review and improve how water is managed in the operation.

After finalising the operating strategy, the department will finalise the conditions for the licence and issue it to the proponent after fully considering all submitted information and, where applicable, the outcome of any EPA or other regulatory agency decisions.

If a staged approach to the development has been taken, licences will be incrementally issued as the development proceeds and as the available information improves.

**Stage D input**

Inputs include the 5C licence application, all supporting information, which may include a hydrogeological report, and the operating strategy.

**Stage D output**

Outputs will include an approved 5C licence(s) with licence conditions, the approved operating strategy, and operational water balance, as shown in Figure 5.
### Table 4  Information that will assist operating strategy preparation

<table>
<thead>
<tr>
<th>Component</th>
<th>Preparation and assessment of the operating strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>D.1</strong></td>
<td>Area of impact: project area</td>
</tr>
<tr>
<td><strong>D.2</strong></td>
<td>Area of impact: aquifer</td>
</tr>
<tr>
<td><strong>D.3</strong></td>
<td>Areas of impact: ecological and cultural values</td>
</tr>
<tr>
<td><strong>D.4</strong></td>
<td>Area of impact: water quality</td>
</tr>
<tr>
<td>Component</td>
<td>Preparation and assessment of the operating strategy</td>
</tr>
<tr>
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<td>---------------------------------------------------</td>
</tr>
</tbody>
</table>
| D.5 Area of impact: infrastructure requirements | Provide a description, including maps and schematic diagrams, of the location of any water-related infrastructure. Include:  
- groundwater bores or wells  
- surface water extraction points  
- water storage areas  
- diversion points  
- discharge points  
- meters  
- distribution systems  
- options to consolidate infrastructure  
- schedule of water-related infrastructure maintenance – for example, checking pipe work and any other requirements. |
| D.6 Abstraction and water use | List the proposed water abstraction volumes, usage volumes and discharge or re-injection (if applicable) volumes, as both monthly and annual figures. Include and, where possible, tabulate:  
- estimates of volumes and flow rates  
- abstraction from each groundwater well or surface water source  
- individual uses such as dust suppression, process water and any other possible usage  
- each point of discharge/re-injection  
- operating schedules, where variations in abstraction are expected  
- project timeline, including expected date of mine closure. |
| D.7 Water balance diagram(s) | Provide a quantitative water balance diagram, highlighting where significant volumes of water are abstracted and released. Include:  
- where all water is obtained, used, recycled and disposed of within the project area  
- a map showing the location of flow meters within the project area. |
<table>
<thead>
<tr>
<th>Component</th>
<th>Preparation and assessment of the operating strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>D.8 Water release management</td>
<td>Provide a description of water releases to the environment. Include and, where possible, tabulate: • release regime (quantity, timing, volumes) • receiving water bodies • final quality of released water and baseline quality of receiving water bodies • length of affected stream water environment downstream • measures to ensure water quality changes are managed • potential impacts due to interaction with other water users. Policy 6.2 provides further guidance regarding the options for surplus water use or release.</td>
</tr>
<tr>
<td>D.9 Water-use efficiency management</td>
<td>Provide a water-use efficiency plan. Include and, where possible, tabulate: • water-use efficiency targets • methods to achieve water-use efficiency targets • water recycling strategies and programs • fit-for-purpose uses of waste and recycled water • water optimisation offsets where efficiency gains are not desirable • monitoring to assess whether targets are met.</td>
</tr>
<tr>
<td>D.10 Cumulative impact management</td>
<td>Provide a detailed description of strategies used to mitigate cumulative impacts on the water regime. Include: • arrangements for shared monitoring, where appropriate • arrangement for shared modelling, where appropriate • site-scale management strategies • catchment-scale management strategies • how the proposed strategies relate to the regional-and-mine water management objectives • mechanisms for ensuring compliance with the water management objectives.</td>
</tr>
<tr>
<td>D.11 Post-closure management</td>
<td>Provide a strategy for post-closure water management. Include: • mitigation strategies for impacts that continue post-mining • how the strategies will meet regional-and-mine water management objectives • approach to review and reporting on changes to management objectives.</td>
</tr>
<tr>
<td>Component</td>
<td>Preparation and assessment of the operating strategy</td>
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<td>---------------------------------------------------</td>
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<tr>
<td>D.12</td>
<td>Monitoring</td>
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<tr>
<td></td>
<td>Provide a detailed monitoring program, including methods, procedures and schedules for monitoring commitments for water-use activities. Monitoring requirements include:</td>
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<tr>
<td></td>
<td>• abstraction volumes and rates from individual wells</td>
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<td></td>
<td>• water-sample analysis from individual wells, as detailed in <em>Operational Policy 5.12 – Hydrogeological reporting associated with a groundwater well licence.</em></td>
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<tr>
<td></td>
<td>• aquifer water levels</td>
</tr>
<tr>
<td></td>
<td>• water usage volumes, separated into specific uses</td>
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<td></td>
<td>• volume of water discharged from each individual discharge point</td>
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<td></td>
<td>• monitoring relating to the impacts of dewatering and release of water on surrounding environment, for example, vegetation monitoring, surface water levels and flow rates</td>
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<tr>
<td></td>
<td>• monitoring water-use efficiency plans and programs</td>
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<td></td>
<td>• monitoring at extended footprint</td>
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<td></td>
<td>• shared monitoring for cumulative impacts.</td>
</tr>
<tr>
<td>D.13</td>
<td>Reporting</td>
</tr>
<tr>
<td></td>
<td>Provide a detailed schedule of reporting, including information that is to be included in any required annual or triennial report. Include as a minimum:</td>
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<tr>
<td></td>
<td>• reporting of all monitoring data, including historical data and graphs of trends (abstraction volumes should be reported as monthly and annual figures)</td>
</tr>
<tr>
<td></td>
<td>• actual water balance against that in the operating strategy</td>
</tr>
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<td></td>
<td>• breaches of conditions, including breaches of operating strategy commitments as well as actions taken</td>
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<tr>
<td></td>
<td>• time frames for notification to the department in cases where the commitments in the operating strategy cannot be met, including reasons why and actions proposed</td>
</tr>
<tr>
<td></td>
<td>• time frames for notification to the department of any emergency situation, relating to a <em>Rights in Water and Irrigation Act 1914</em> licence, so permission to take immediate action can be obtained.</td>
</tr>
</tbody>
</table>
**Component** | **Preparation and assessment of the operating strategy**
--- | ---
D.14 Defining triggers and thresholds | Clearly define environmental impact triggers to aid the implementation of contingency measures. Define the triggers based on benchmarks and investigation results.
- Is there potential to affect other water users?
- Is there potential to affect water-dependent ecosystems?
- Is there potential for quality of the water resource to be degraded?
Where there are no potential impacts, no triggers are required. Where an impact is possible, a trigger is required and where an impact is likely, staged triggers are required. Examples of triggers include, but are not limited to, percentage of reduction (increase) of vegetation, water quality parameters, erosion levels, groundwater or surface water levels.

D.15 Contingency measures | Provide detailed contingency measures that include actions to reduce environmental risks and mitigate adverse changes to the water regime.
Define contingency measures for environmental risk and operational risk:
- Is there potential to affect other water users?
  a) none – no measures required
  b) possible – design monitoring to quantify impact
  c) likely – describe appropriate contingency actions.
- Is there potential to affect water-dependent ecosystems?
  a) none – none required
  b) possible – review monitoring
  c) likely – contingency actions.
- Is there potential for the degradation of water quality of the resource?
  a) none – none required
  b) possible – review monitoring
  c) likely – contingency actions.
  • What is the level of knowledge of the aquifer or surface water resource?
    a) no knowledge
    b) some knowledge
    c) good knowledge.
Examples of contingency measures include, but are not limited to, alternative discharge points and extraction points, reducing pumping rates and increased monitoring.
### Component: Administrative requirements

**D.16** Provide the administrative requirements for an operating strategy. Include:
- summary of all monitoring, reporting and contingency commitments listed in the operating strategy
- a list of references and related documents, including any relevant hydrogeological reports, relevant company policies and Environmental Protection Authority–approved management plans
- intended date of submission of reporting documents, such as annual and triennial aquifer reviews
- operating strategy review date
- details of persons responsible for ensuring operating strategy commitments and Rights in Water and Irrigation Act 1914 licence conditions are met
- sharing arrangements to manage water regime interactions with other water users.

### Component: Water balance

**D.17** Provide a mine-site water balance, detailing all:
- uses and predicted volumes
- discharge points and predicted volumes
- sources and predicted volumes.
Figure 5  Example of a mine-site water balance, showing all water sources, usage and discharge points, and associated volumes.

3.5 Stage E — Construction and operation

In Stage E the proponent manages the taking, use and management of water in accordance with the approved operating strategy and other licence conditions over the life of the mine. This will typically involve the proponent regularly reporting to the department and other agencies and using adaptive management practices.

Adaptive management is a systematic process for improvement and is critical to leading-practice water management. Adaptive management works by evaluating how effective a process or strategy is, in meeting a defined objective. The proponent then uses the results of their evaluation to modify their management and monitoring programs. Proposed changes to the operating strategy and related water management plans are to be reviewed and approved by Department of Water.

Table 5 provides guidance to proponents for developing an adaptive management program.
Stage E input

Inputs are the operating strategy and licence conditions finalised in Stage D.

Stage E output

Outputs include an adaptive management cycle for the life of the project, including reports at agreed intervals, and proposed changes to the operating strategy and monitoring programs, where necessary.

Table 5  Adaptive management guideline

<table>
<thead>
<tr>
<th>Component</th>
<th>Construction and operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>E.1  Reporting</td>
<td>Changes in impacts need to be reported against commitments made in the operating strategy, the management plan and other regulatory requirements. Report against:</td>
</tr>
<tr>
<td></td>
<td>• commitments made in the operating strategy</td>
</tr>
<tr>
<td></td>
<td>• management outcomes in this guideline</td>
</tr>
<tr>
<td></td>
<td>• mine closure plan (if appropriate)</td>
</tr>
<tr>
<td></td>
<td>• ministerial commitments made by the Environmental Protection Authority</td>
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<tr>
<td></td>
<td>• commitments in the water management plan.</td>
</tr>
<tr>
<td>E.2  Evaluating the management</td>
<td>On a regular cycle, assess all of the management actions against the management objectives. Have the management objectives been met?</td>
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<tr>
<td></td>
<td>• If yes, is current management suitable to continue? Are there lessons to inform better management?</td>
</tr>
<tr>
<td></td>
<td>• If no, were planned responses to triggers implemented? Were they adequate?</td>
</tr>
<tr>
<td>E.3  Evaluating the impacts</td>
<td>On a regular cycle, assess the condition of the water resource. Have the water resource objectives been met?</td>
</tr>
<tr>
<td></td>
<td>• If yes, is current management suitable to continue? Are there lessons to inform better management?</td>
</tr>
<tr>
<td></td>
<td>• If impacts are observed, implement corrective actions as per operating strategy.</td>
</tr>
<tr>
<td></td>
<td>• If no, were planned responses to triggers implemented? Were they adequate?</td>
</tr>
</tbody>
</table>
Component | Construction and operation
--- | ---
E.4 Updating management | Based on evaluation, implement any required changes to management. Changes can include:
• making changes to the management framework
• improving mine site practices
• reviewing the water balance and making changes
• reviewing the operating strategy and making changes
• reviewing the monitoring program
• submitting proposed changes made to the department for approval.

E.5 Updating the monitoring program | On a regular cycle, review and compare the monitoring program to monitoring objectives. That review can include:
• assessing reliability and applicability, to support decisions
• reviewing appropriateness of methodology and scale
• improvement, to allow for overall integration.

3.6 Stage F – Decommissioning and closure

In Stage F the proponent manages the long-term impacts of the operation beyond the life of the mine. Decommissioning and closure plans form part of the original scoping phase documents and the operating strategy.

Management of potential groundwater and surface-water quality impacts are important to ensure that there are no environmental impacts after the project has ended. Conditions on a water licence are no longer applicable beyond expiry of the licence but management of longer term environmental impacts may be continued by the EPA.

Primary concerns for the Department of Water include the containment of tailings, the correct decommissioning of bores to ensure that water is not wasted and closure of water storage facilities. In many cases, proponents may negotiate with pastoral lease holders or other nearby mining companies or irrigators for use of the water beyond the mine life. However, if an agreed outcome with a third party cannot be reached, water will need to be disposed of in a way that will not cause any detrimental impact to the water quality of the surrounding catchment or groundwater area.

Stage F input

An input is a mine closure plan, prepared in accordance with the DMP’s Guideline for preparing mine closure plans (June 2011).
Stage F output

Outputs include a strategy for management of impacts post-closure.

Table 6  Post-closure management

<table>
<thead>
<tr>
<th>Component</th>
<th>Decommissioning and closure</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.1 Post closure</td>
<td>Provide a strategy for post-closure water management. Include:</td>
</tr>
<tr>
<td>management</td>
<td>• mitigation strategies for impacts that continue post-mining</td>
</tr>
<tr>
<td></td>
<td>• how the strategies will meet regional-and-mine water management objectives</td>
</tr>
<tr>
<td></td>
<td>• approach to review and reporting on changes to management objectives.</td>
</tr>
<tr>
<td>F2 Post-closure</td>
<td>Describe the mechanisms proposed for managing the long-term after-closure changes to the water regime, resulting from the mine operations. The description needs to include:</td>
</tr>
<tr>
<td>management</td>
<td>• a prediction of changes in water quality of any planned pit lake over time</td>
</tr>
<tr>
<td></td>
<td>• a prediction of long-term impact on downstream water quality and flow regimes, from modifications to surface water features</td>
</tr>
<tr>
<td></td>
<td>• a water resource condition objective for mine closure for the affected water regime</td>
</tr>
<tr>
<td></td>
<td>• a proposed monitoring program to check the predicted trends</td>
</tr>
<tr>
<td></td>
<td>• future re-use options for water storage facilities</td>
</tr>
<tr>
<td></td>
<td>• containment of tailings.</td>
</tr>
<tr>
<td>F3 Decommissioning</td>
<td>• Bores that have no intended future use beyond closure must be decommissioned in accordance with the publication <em>Minimum construction requirements for water bores in Australia</em>.</td>
</tr>
<tr>
<td>of bores</td>
<td></td>
</tr>
<tr>
<td>F4 Mine voids</td>
<td>• Closure, use and management of mine voids must not unduly impact the environment or water resources.</td>
</tr>
<tr>
<td></td>
<td>• Any use of mine voids for the storage or transfer of water will be managed through licences. The duration of storage and options analysis for removing the water must also be included within the mine closure plan.</td>
</tr>
<tr>
<td>Component</td>
<td>Decommissioning and closure</td>
</tr>
<tr>
<td>-----------</td>
<td>-----------------------------</td>
</tr>
<tr>
<td>F5</td>
<td>Management of the water resource during mine closure</td>
</tr>
<tr>
<td></td>
<td>• A mine closure plan should be provided for consideration before a licence to abstract water can be issued. The closure plan should identify the long-term water quality and quantity issues that exist and propose a management approach. The management needs to include monitoring and mitigation for the duration of the potential impact.</td>
</tr>
<tr>
<td></td>
<td>• All use of water in the management and remediation of mine sites and mine voids requires licensing by the department. Licence conditions regarding the diversion, dewatering, monitoring and management of water will be applied. This may include the volume, frequency, pump rate, diversion location, water levels, and water quality of the water use. Triggers and responses for each of these conditions will be included within the operating strategy for the licence.</td>
</tr>
</tbody>
</table>

---

**Figure 6**  
An adaptive management model
4 Policies for water allocation and use in the mining industry

The set of policies outlined in Table 7 has been developed specifically for issues associated with mining activities and should be used by proponents in preparation of applications for Rights in Water and Irrigation Act 1914 permits and licences. Department of Water will use these policies during its assessment of any applications.

Table 7 Policies for water allocation and use in the mining industry

<table>
<thead>
<tr>
<th>Policy group</th>
<th>Policy detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Exploration for water resources</td>
<td></td>
</tr>
<tr>
<td>1.1 Exploration</td>
<td>a) A licence under section 26D of the Rights in Water and Irrigation Act 1914 is required before a proponent can investigate the groundwater resource. There is no guarantee licences to take water (under section 5C of the Rights in Water and Irrigation Act 1914) will be issued at the completion of the investigation.</td>
</tr>
<tr>
<td></td>
<td>b) Where discharges of abstracted groundwater from pump-testing occur, they will need to meet water-release criteria relevant to the discharge site, including creeks and infiltration trenches. The criteria are required to ensure that the quality of the water, the health of the flora and fauna, and the soils at the discharge site are not compromised.</td>
</tr>
<tr>
<td></td>
<td>c) Where large-scale or long-term pump-testing is likely to create a significant impact on the environment or other users, proponents may be required to obtain a section 5C licence.</td>
</tr>
<tr>
<td>2 Environmental policy</td>
<td></td>
</tr>
<tr>
<td>2.1 Ecological impact management</td>
<td>a) As part of an application, proponents are expected to identify groundwater dependent values, as per Operational policy no. 5.12 – Hydrogeological reporting associated with a groundwater well licence. On renewal, existing licences may be amended to require identification of water-dependent ecosystems, where they have not previously been included.</td>
</tr>
<tr>
<td></td>
<td>b) The location of production bores and rates of abstraction must consider the proximity to groundwater-dependent ecosystems and must be designed to minimise adverse impacts. This does not apply to the construction and location of monitoring bores.</td>
</tr>
</tbody>
</table>
### 3 Water quality policy

#### 3.1 General

a) The Department of Water may require a licensee to monitor and report against the quality of a water resource, in particular its salinity and acidity. Water resource use must not alter the water quality such that it adversely affects a water-dependent value or other users. Requirements to monitor and report may be included as conditions on the licence.

b) Where self-supply water is used for mining camp purposes it is advisable that the water be filtered, treated and tested, according to public health advice available from the Department of Health Water Quality branch. The Department of Water also has water quality protection notes to provide guidance on using ‘community’ and ‘private’ supplies. The *Australian drinking water guidelines* and *Australian fresh and marine water quality guidelines* also provide information on relevant drinking-water quality criteria. Mine site design and layout must ensure mine-camp potable supplies are adequately protected to prevent contamination of the water source.

#### 3.2 Salinity

a) Where a licence application has the potential to increase the baseline salinity of a water resource, the applicant is required to assess and define how the water quality deterioration will be managed in the long term. The department will apply additional licence conditions to manage the water-use impacts, protect water quality and protect dependent ecosystems.

#### 3.3 Acidity and potentially acid-forming material

a) Any licence under section 5C of the *Rights in Water and Irrigation Act 1914* will not be granted until the risks associated with the use of water, that may expose potentially acid-forming material and lead to groundwater acidification, are identified and addressed.
### Western Australian water in mining guideline: Draft for public comment

#### Water resource allocation planning series, no. 12

#### Department of Water

#### 3.4 Point source pollution and contaminated sites

<table>
<thead>
<tr>
<th>Policy group</th>
<th>Policy detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>b)</td>
<td>The licensee will be required to address the risks of potentially acid-forming material by demonstrating the potential impacts can be managed through an impact management strategy within the operating strategy. The information submitted in support of the licence application will be used to develop licence conditions and monitoring requirements for the licence.</td>
</tr>
</tbody>
</table>

#### 3.5 Public drinking water source areas

<table>
<thead>
<tr>
<th>Policy group</th>
<th>Policy detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td>Point-source pollution of water through industrial or other activities is regulated through the Environment Protection Act 1986. The Department of Environment and Conservation must be contacted if evidence of a pollution event is identified.</td>
</tr>
<tr>
<td>b)</td>
<td>New production bores are not to be located within 500 m of an identified contaminated site (see Contaminated sites register). The distance may be varied if the applicant can demonstrate the proposed abstraction will not affect the water levels connected to the contaminated site, the environment or public health. This policy does not apply to monitoring bores, bores constructed for environmental management purposes or remedial work associated with the contaminated site.</td>
</tr>
<tr>
<td>c)</td>
<td>Water quality protection in Western Australia is subject to the by-laws of the Country Areas Water Supply Act 1947.</td>
</tr>
</tbody>
</table>

#### 4 Cultural policy

<table>
<thead>
<tr>
<th>Policy group</th>
<th>Policy detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1 Cultural sites</td>
<td>Applicants are required to meet any statutory requirements under the State’s Aboriginal Heritage Act 1972 and the Australian Government’s Native Title Act 1993.</td>
</tr>
</tbody>
</table>

#### 5 Dewatering and excess water management

<table>
<thead>
<tr>
<th>Policy group</th>
<th>Policy detail</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1 Impacts from abstraction</td>
<td>All new licence applications for groundwater abstraction for commercial or other purposes, requiring construction of a bore or use of an existing bore, must recognise dewatering activities in the area will have an impact on the water levels, quality and pump rates required for use.</td>
</tr>
<tr>
<td>Policy group</td>
<td>Policy detail</td>
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<tr>
<td></td>
<td>Applicants are responsible for drilling to an appropriate depth to ensure the effects likely to occur as a result of the dewatering are minimised. The department will provide advice to the applicant on depth and the likely impacts for a given area and aquifer.</td>
</tr>
<tr>
<td></td>
<td>b) Groundwater monitoring bores must be installed to monitor water levels and quality on a monthly basis and to determine the effects of dewatering on the aquifer and water levels of connected systems. This is a minimum requirement and may be increased depending on the level of risk. The department will advise the licensee when monitoring is required.</td>
</tr>
<tr>
<td>5.2 Use and release of water</td>
<td>a) Prior to the issuing of a water licence, the proponent must submit a water balance and define the end use or discharge of the dewater. The assessed options for reuse, aquifer re-injection, and/or release of dewater must be included within the hydrogeological assessment or other supporting documentation. The schedule of options will detail how the water could be re-used and/or released including, but not limited to, volume, location, durations, costs and benefits to the surrounding environment.</td>
</tr>
<tr>
<td></td>
<td>b) The following are the department’s options for use and/or release of dewatering volumes (once referred to as a hierarchy).</td>
</tr>
<tr>
<td></td>
<td>1 Mitigation of environmental impacts (including maintenance of groundwater dependent ecosystems).</td>
</tr>
<tr>
<td></td>
<td>2 Use for fit-for-purpose activities (such as processing and dust suppression). The proponent needs to demonstrate that the water is of suitable quality for the end use.</td>
</tr>
<tr>
<td></td>
<td>3 The proponent needs to provide options for the best use of mine dewatering surplus.</td>
</tr>
<tr>
<td></td>
<td>i) Transfer of water to a third party to meet other demand, including other proponents in the area and public water supply, as approved by the department. Where it is proposed to use the water for public supply, a drinking water source protection plan should be developed and approved by the Department of Water and Department of Health.</td>
</tr>
<tr>
<td></td>
<td>ii) Re-injection back into the aquifer at designated sites determined by the proponent and agreed by the Department of Water.</td>
</tr>
<tr>
<td>Policy group</td>
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<tr>
<td></td>
<td>iii) Controlled release to the environment where the dewater release is allowed to flow (either through a pipe or overland) into a designated water course or wetland determined by the proponent and agreed by the department.</td>
</tr>
<tr>
<td></td>
<td>c) The department will assess release of dewater on a case-by-case basis, recognising background water levels (quality and quantity) of the receiving environment, the seasonal flows of the watercourse and ANZECC guidelines.</td>
</tr>
<tr>
<td></td>
<td>d) Dewatering discharges greater than 50 000 KL (50 ML) a year are regulated by DEC under requirements of the <em>Environmental Protection Act 1986</em>. In these instances, Department of Water will align its processes with those of DEC.</td>
</tr>
<tr>
<td></td>
<td>e) Proponents that undertake dewatering will not be permitted to discharge to the environment where there is a likelihood that it will cause impacts to other land users (including inundation of land) or significant environmental damage (including water quality, acidification, erosion, damage to river bed and/or banks and altered water levels at sites with ecological and cultural assets). In order to reduce and, where possible, eliminate risks, the department will include licence conditions that require monitoring, management and mitigation.</td>
</tr>
<tr>
<td>5.3 Excess water discharge into salt lakes of the Goldfields</td>
<td>a) Discharges of excess water into salt lakes in the Goldfields will be assessed as per Department of Water’s ‘Development of framework for assessing the cumulative impacts of dewatering discharge to salt lakes in the Goldfields of Western Australia’.</td>
</tr>
<tr>
<td>5.4 Allocation of dewater release</td>
<td>a) Any proposed agreement with third parties on the use of dewatering should be done in consultation with the department. The use of excess water will be supported by the department where the use of that water can be shown to reduce environmental impacts, facilitate appropriate and sustainable development, or have some other social or environmental benefit. It should be noted that the department does not have a regulatory approval role for third party access to water.</td>
</tr>
<tr>
<td>6 Mine closure</td>
<td></td>
</tr>
<tr>
<td>6.1 Mine voids</td>
<td>a) Closure, use and management of mine voids must not unduly impact the environment or water resources.</td>
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<tr>
<td>Policy group</td>
<td>Policy detail</td>
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<td>----------------------------------------------------------------------------</td>
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<tr>
<td>b) Any use of mine voids for the storage or transfer of water will be managed through licences. The duration of storage and options analysis for removing the water must also be included within the mine closure plan.</td>
<td></td>
</tr>
<tr>
<td>6.2 Management of the water resource during mine closure</td>
<td>a) A mine closure plan should be provided for consideration before a licence to abstract water can be issued. The closure plan should identify the long-term water quality and quantity issues that exist and propose a management approach. The management needs to include monitoring and mitigation for the duration of the potential impact.</td>
</tr>
<tr>
<td>b) All use of water in the management and remediation of mine sites and mine voids requires licensing by the department. Licence conditions regarding the diversion, dewatering, monitoring and management of water will be applied. This may include the volume, frequency, pump rate, diversion location, water levels, and water quality of the water use. Triggers and responses for each of these conditions will be included within the operating strategy for the licence.</td>
<td></td>
</tr>
<tr>
<td>7 Water use optimisation</td>
<td>7.1 Water-use efficiency and optimisation of water at site</td>
</tr>
<tr>
<td>a) Where the proponent identifies a project’s operations to be water deficit, water-use efficiency methods must be utilised together with a water-use efficiency plan (included within the operating strategy).</td>
<td></td>
</tr>
<tr>
<td>b) Where the proponent identifies water surplus in operations, options for use and/or release of dewatering discharge must be considered according to the department’s options in policy 6.2. In these situations, water-use efficiency may not be as important.</td>
<td></td>
</tr>
<tr>
<td>7.2 Fit for purpose</td>
<td></td>
</tr>
<tr>
<td>a) Proponents with a variety of site water requirements should assess all fit-for-purpose water options available to them. The department does not endorse the use of high-quality water in industrial processing. New licence applications for industrial water will not be approved for high-quality water resources without a justification for the use of the water for that purpose.</td>
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<td>Policy group</td>
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</tr>
<tr>
<td><strong>8 Fractured rock resources</strong></td>
<td></td>
</tr>
</tbody>
</table>
| 8.1 Water availability and impact management | a) Applications to abstract water from fractured rock resources will be dealt with on a case-by-case basis, where the proponent can:  
   - adequately demonstrate water is available and impacts on water-dependent values and other users can be managed  
   - the aquifer can recover over a period of time after cessation of mining, such that water-dependent values are not affected on an ongoing basis  
   Allocation limits may not be appropriate in these resources, given the localised and heterogeneous nature of their geology. |
| 8.2 Long-term impacts and closure | a) Depletion of aquifer storage and long-term issues after the cessation of mining should be addressed prior to commencement of mining and included in the closure plan for the mine. Parameters for assessing the recovery of the resource should be identified prior to the commencement of operations.  
b) When assessing recovery of a fractured rock resource the department will consider:  
   - changes in groundwater level and storage depletion  
   - changes in water quality  
   - zones of impact. |
<p>| <strong>9. Uranium mining</strong> | |
| 9.1 In situ leaching | a) For in situ leaching operations, the proposal must be based on a full understanding of the hydrological, hydrogeological and hydrogeochemical features of the aquifer, the current and potential uses and values of groundwater resources, and connected ecosystems and natural radioactivity in the project area. |
| 9.2 Groundwater impacts | a) Mining should not compromise groundwater in the mineralised aquifer to the extent that it cannot be remediated to meet the agreed post-mining use at mine completion. At no stage should mining compromise groundwater use in the mineralised aquifer outside an agreed distance (not exceeding a few kilometres) or groundwater travel time from a mined area. |
| 9.3 Best practice | a) Refer to <em>Australia's in situ recovery uranium mining best practice guide: Groundwaters, residues and radiation protection</em>. |</p>
<table>
<thead>
<tr>
<th>Policy group</th>
<th>Policy detail</th>
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</thead>
<tbody>
<tr>
<td>10. Cumulative impacts</td>
<td>a) The department will regulate cumulative impacts of additional mining operations through the 5C licensing process, and through advice to the EPA and other regulatory agencies.</td>
</tr>
<tr>
<td>10.1 Cumulative impact management</td>
<td>b) New entrants to an area that cause impacts beyond those agreed for current commercial abstraction-and-release will be responsible for investigating and identifying potential cumulative impacts.</td>
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<tr>
<td></td>
<td>c) Ongoing management and monitoring of impacts will require negotiation between the responsible operations. This may involve:</td>
</tr>
<tr>
<td></td>
<td>• significant communication</td>
</tr>
<tr>
<td></td>
<td>• shared monitoring and modelling</td>
</tr>
<tr>
<td></td>
<td>• management of impact areas</td>
</tr>
<tr>
<td></td>
<td>• reporting of impacts.</td>
</tr>
<tr>
<td></td>
<td>Actions beyond respective mine tenement boundaries may be required to achieve water and environmental outcomes.</td>
</tr>
<tr>
<td></td>
<td>d) The approval of a new operation may necessitate changes to 5C licences for existing operations.</td>
</tr>
</tbody>
</table>
5 Implementation and review

5.1 Reviewing the guideline

The Department of Water will ensure this guideline remains relevant and applicable through periodic reviews. Improvements in technology, developments in the mining industry and new knowledge gained from practical experience will all feed into potential adjustments to the guideline.
# Shortened Forms

<table>
<thead>
<tr>
<th>Shortened Form</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANZECC</td>
<td>Australian and New Zealand Environment Conservation Council</td>
</tr>
<tr>
<td>DEC</td>
<td>Department of Environment and Conservation</td>
</tr>
<tr>
<td>DMP</td>
<td>Department of Mines and Petroleum</td>
</tr>
<tr>
<td>DSD</td>
<td>Department of State Development</td>
</tr>
<tr>
<td>EPA</td>
<td>Environmental Protection Authority</td>
</tr>
</tbody>
</table>
## Glossary

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>abstraction</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>allocation limits</strong></td>
<td>The amount of water set aside for annual licensed use. Each water resource (aquifer) within a subarea has an allocation limit set that will be amended over time to reflect significant measurement outcomes and sustainability determinations.</td>
</tr>
<tr>
<td><strong>aquifer</strong></td>
<td>A geological formation or group of formations that is able to receive, store and transmit significant quantities of groundwater.</td>
</tr>
<tr>
<td><strong>bore</strong></td>
<td>A narrow and normally vertical hole drilled in soil or rock to measure or withdraw groundwater from an aquifer.</td>
</tr>
<tr>
<td><strong>confined aquifer</strong></td>
<td>An aquifer lying between confining layers of low permeability strata (such as clay, coal or rock), so that the water in the aquifer cannot easily vertically flow.</td>
</tr>
<tr>
<td><strong>dewatering</strong></td>
<td>Removing underground water to facilitate construction or other activity. It is often used as a safety measure in mining below the watertable or as a preliminary step to development in an area.</td>
</tr>
<tr>
<td><strong>discharge</strong></td>
<td>The water that moves from the groundwater to the ground surface or above, such as a spring. This includes water that seeps onto the ground surface, evaporation from unsaturated soil, and water extracted from groundwater by plants (evapotranspiration) or engineering works (groundwater pumping).</td>
</tr>
<tr>
<td><strong>drawdown</strong></td>
<td>The lowering of a watertable resulting from the removal of water from an aquifer or reduction in hydraulic pressure.</td>
</tr>
<tr>
<td><strong>ecological water requirements</strong></td>
<td>The water regime needed to maintain ecological values of water-dependent ecosystems at a low level of risk.</td>
</tr>
<tr>
<td><strong>environmental water provisions</strong></td>
<td>The water regimes that are provided as a result of the water allocation decision-making process which takes into account ecological, social, cultural and economic impacts. They may meet, in part or in full, the ecological water requirements.</td>
</tr>
<tr>
<td>Term</td>
<td>Definition</td>
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<td>-----------------------------------------</td>
<td>-------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td><strong>first-in-first-served</strong></td>
<td>A process by which groundwater entitlements are allocated consistent with the order in which licence applications are received by the Department of Water.</td>
</tr>
<tr>
<td><strong>groundwater</strong></td>
<td>Water which occupies the pores and crevices of rock or soil beneath the land surface.</td>
</tr>
<tr>
<td><strong>groundwater area</strong></td>
<td>The boundaries that are proclaimed under the <em>Rights in Water and Irrigation Act 1914</em> and used for water allocation planning and management.</td>
</tr>
<tr>
<td><strong>groundwater subarea</strong></td>
<td>Areas defined by the Department of Water within a groundwater area, used for water allocation planning and management.</td>
</tr>
<tr>
<td><strong>Groundwater-dependent ecosystem</strong></td>
<td>An ecosystem that is dependent on groundwater for its existence and health.</td>
</tr>
<tr>
<td><strong>hydrogeology</strong></td>
<td>The hydrological and geological science concerned with the occurrence, distribution, quality and movement of groundwater, especially relating to the distribution of aquifers, and groundwater flow and quality.</td>
</tr>
<tr>
<td><strong>impermeable</strong></td>
<td>Not permitting the passage of a substance (in this case, water) through pores of a more dense substance.</td>
</tr>
<tr>
<td><strong>licence</strong></td>
<td>A formal instrument which entitles the licence holder to ‘take’ water from a watercourse, wetland or underground source.</td>
</tr>
<tr>
<td><strong>proclaimed area</strong></td>
<td>An area gazetted under the Rights in Water and Irrigation Act. A licence to take water is required in a proclaimed area.</td>
</tr>
<tr>
<td><strong>public drinking water source areas</strong></td>
<td>Includes all underground water pollution control areas, catchment areas and water reserves constituted under the <em>Metropolitan Water Supply Sewerage and Drainage Act 1909 and the Country Areas Water Supply Act 1947</em>.</td>
</tr>
<tr>
<td><strong>recharge</strong></td>
<td>Water that infiltrates into the soil to replenish an aquifer.</td>
</tr>
<tr>
<td><strong>re-injection</strong></td>
<td>The pumping of water back into an aquifer.</td>
</tr>
<tr>
<td><strong>riparian right</strong></td>
<td>The right of a land owner 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.</td>
</tr>
</tbody>
</table>
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) or total soluble salts (TSS). 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).

social water requirement Elements of the water regime that are needed to maintain social and cultural values.

stock and domestic water use Water that is used for ordinary domestic purposes associated with a dwelling, such as: water for cattle or stock other than 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.

Note: Intensive conditions under the Rights and Water Irrigation Act 1914 means ‘conditions in which the cattle or stock: a) are confined to an area smaller than that required for grazing under normal conditions and b) are usually fed by hand or by mechanical means.’

subarea A sub-division within a surface or groundwater area, defined for the purpose of managing the allocation of groundwater resources. Subareas are not proclaimed and can therefore be changed by the department without being gazetted. See also groundwater subarea.

sub-artesian aquifer A confined aquifer in which the hydraulic pressure is insufficient to cause the well to flow at the surface.

sustainability Meeting the needs of current and future generations through integration of environmental protection, social advancement and economic prosperity.

sustainable groundwater yield The amount of water that can be abstracted/extracted over time from a water resource while maintaining the ecological values (including assets, functions and processes).

water efficiency The minimisation or optimisation of water use through adoption of best management practices.
water entitlement  The quantity of water that a person is entitled to take on an annual basis in accordance with the Rights in Water and Irrigation Act 1914 or a licence.

wetland  Wetlands are areas that are permanently, seasonally or intermittently waterlogged or inundated with water that may be fresh, saline, flowing or static, and include areas of marine water of which the depth at low tide does not exceed 6 metres.
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**Legislation**

*Rights in Water and Irrigation Act 1914*

Rights in Water and Irrigation Regulations 2000