



Policy

Managed aquifer recharge in Western Australia

*Formerly Operational Policy 1.01
Managed aquifer recharge in Western Australia*

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1. Policy statement

The Department of Water and Environmental Regulation (the department) supports managed aquifer recharge (MAR) as a means of optimising the use of the state's valuable water resources. The department will approve MAR operations provided potential impacts on the environment¹, water users and public health² are determined to be acceptable based on this policy and the accompanying guideline.

The department defines MAR as the intentional recharge of an aquifer under controlled conditions for subsequent recovery, demonstrable environmental benefit³, or mitigation of the impacts of abstraction⁴. MAR recharge must be an additional contribution to an aquifer, not a return of abstracted water.

Recharge and recovery volumes for MAR will be managed separately to allocation limits for water resources.

Some activities are excluded as outlined in section 5.2.

1.1 Intent

This policy aims to facilitate options for MAR operations with beneficial water resource and environmental management outcomes, such as:

- alternative water supplies, particularly where water resources are fully allocated
- fit-for-purpose water supply for non-drinking (e.g. public open space) and drinking purposes
- development of climate-resilient water supplies.

1.2 Principles

- The environmental values of aquifers, water resources (including public drinking water sources), ecosystems, water users and public health need to be protected.
- Water resources and ecosystems should be managed sustainably.
- The use of water resources should be optimised.
- Innovation in water supply and use should be supported.

¹ Includes aquifers, groundwater and surface water resources (including public drinking water sources), and ecosystems. See glossary for definition of environment. This policy does not specifically address potential air and noise issues.

² Consideration of public health by the department only applies where approval is required under the *Environmental Protection Act 1986* and all references to public health throughout this policy and accompanying MAR guideline only apply where the *Environmental Protection Act 1986* is applicable.

³ Managed aquifer recharge that directly benefits groundwater-dependent ecosystems.

⁴ Managed aquifer recharge that directly counteracts the impacts of abstraction, such as creating a barrier that prevents movement of the saltwater interface.



- Decisions made by regulatory bodies should be fair and transparent.

1.3 Outcomes

- A management framework is established for MAR operations under the current water and environmental legislation in Western Australia.
- The management framework facilitates options for MAR while ensuring that the environment, water users and public health are protected.
- The best use is made of water resources and less water is wasted.
- Demands on natural water resources are reduced (e.g. by utilising alternative sources that would normally be wasted).
- Availability of water for productive uses is increased.
- Proponents have confidence in the decision-making of the department and clarity on approvals processes.

2. Context

2.1 Issue

Our natural groundwater and surface water resources are under pressure because of increasing population, development and the resulting demand for water. This is compounded by the impacts of climate change, which is reducing rainfall in some parts of the state, particularly in the south-west.

Innovative uses of water are needed to meet the increasing environmental and user demands. Where hydrogeological and environmental conditions are suitable, MAR can be used to meet these demands by optimising the use of water and supplementing, or even replacing, traditional water sources.

MAR can have many social, economic and environmental benefits, but must be managed appropriately to ensure that potential impacts on the environment, water users and public health are acceptable.

2.2 Related documents

The department's *Guideline – Water and environmental considerations in Managed Aquifer Recharge operations in Western Australia* accompanies this MAR policy. It includes references to key policies and guidelines relevant to MAR.

In addition, the *National Water Quality Management Strategy* (Australian Government 2018) guidelines and documents provide detailed information on MAR feasibility, assessment and management.

Refer to the [department's website](#) for links to all published documents, regulatory information and our framework.



Refer to the [Environmental Protection Authority's \(EPA\) website](#) for EPA policy and assessments.

3. What are the legislative requirements for MAR?

The department administers the following legislation relevant to MAR operations, including associated regulations and by-laws:

- *Water Agencies (Powers) Act 1984*
- *Rights in Water and Irrigation Act 1914*
- *Water Services Act 2012*
- *Metropolitan Water Supply, Sewerage and Drainage Act 1909*
- *Country Areas Water Supply Act 1947*
- *Environmental Protection Act 1986*
- *Contaminated Sites Act 2003*.

The main departmental water and environment approvals that may be required for MAR operations are outlined below.

3.1 Rights in Water and Irrigation Act 1914

- Under this Act, the right to the use, flow and control of groundwater is vested in the Crown. Proponents of MAR operations have the same rights as other potential licence holders – regardless of the source of the water or the investment in improvement of water quality – and must apply for a licence in order to recover recharge water.
- A licence to construct or alter a well is required under Section 26D of the Act for injection bores/wells and infiltration works that intersect groundwater in any artesian aquifers or any non-artesian aquifers within proclaimed groundwater areas.
- A licence to take water is required under Section 5C of the Act if water is taken from:
 - a non-artesian aquifer or surface water resource⁵ in an area proclaimed under the *Rights in Water and Irrigation Act 1914* (including proclaimed rivers)
 - an artesian aquifer anywhere within the state
 - an irrigation district proclaimed under the Act.

⁵ includes artificially modified watercourses and wetlands (e.g. those modified into constructed drains or irrigation channels).



- A permit is required for any activity or work that disturbs, destroys or interferes with the waters, bed or banks of a watercourse or drain (including an artificially modified watercourse) within:
 - a proclaimed surface water area (including proclaimed rivers) or irrigation district
 - a wetland situated wholly or partly on crown land
 - land demised by the Crown.

Sections 11 and 17 of the Act apply in proclaimed surface water areas (including proclaimed rivers) and irrigation districts. Sections 21, 21A and 25 apply outside proclaimed areas.

3.2 Water Services Act 2012

- A water services licence or exemption may be required if recovered water is to be provided to other parties (e.g. the public or a third party).

3.3 Environmental Protection Act 1986

- Significant proposals that are assessed by the EPA under Part IV of this Act will require the approval of the Minister for Environment. Proponents must comply with any Ministerial conditions applied to the proposed operation if it is approved.
- If native vegetation is to be cleared for the project, a clearing permit may be required under Part V, Division 2 of the Act. Proponents must comply with any conditions attached to a clearing permit.
- A works approval to construct and a licence under Part V, Division 3 of the Act to operate if the proposed MAR scheme meets the definition of a prescribed premises. The Environmental Protection Regulations 1987 (EP Regulations) specify further that any premises listed in Schedule 1 of the EP Regulations is a prescribed premises (this includes wastewater treatment plants and associated injection/infiltration activities). Proponents must comply with any conditions attached to a works approval or licence.

Several other Western Australian government agencies have a role in the approval and ongoing management of MAR. Proponents must obtain all relevant approvals before they start recharge or recovery operations.

The department's MAR guideline (*Guideline for environmental and water resource considerations in managed aquifer recharge operations in Western Australia*) provides further information on legislative requirements for MAR and prohibited activities. It also includes a summary of approvals required by all state agencies and the Australian Government.



4. Application of this policy

This policy applies to MAR operations within:

- groundwater areas, surface water areas (including proclaimed rivers) and irrigation districts proclaimed under the *Rights in Water and Irrigation Act 1914*
- artesian aquifers throughout the state as defined in the *Rights in Water and Irrigation Act 1914*
- public drinking water source areas proclaimed under the *Metropolitan Water Supply Sewerage and Drainage Area 1909* or the *Country Areas Water Supply Act 1947*
- all areas of the state (other than Commonwealth land) under the *Environmental Protection Act 1986*.

This policy replaces *Operational policy 1.01 – Managed aquifer recharge in Western Australia* (Department of Water, 2011) and earlier practices for MAR operations adopted by the department. It should be used in conjunction with the department's *Guideline – Water and environmental considerations in Managed Aquifer Recharge operations in Western Australia*, and any local rules or documents relevant to the area of a MAR proposal (such as water allocation plans or management strategies). Where legislative instruments such as by-laws, regulations or statutory water allocation plans differ from this policy, they will take precedence.

The department's policy *Water entitlement transactions for Western Australia* (Department of Water, 2010) does not apply to licences to take water granted for MAR operations. Specific transaction rules for such licences are included in this policy (refer to section 5.4, Water).

5. Implementation of this policy

5.1 Activities that may be considered as MAR

Proposals will be considered as MAR and managed in accordance with this policy and the accompanying guideline if they meet the department's definition of MAR, requiring either later recovery, providing environmental benefits or mitigating abstraction. MAR recharge must also be an additional contribution to an aquifer (refer to policy statement, section 1).

Any source water can be considered for MAR (refer to section 5.3).

Defined MAR activities include, but are not limited to:

- infiltration or injection of treated wastewater at wastewater treatment plants with subsequent approved abstraction (see section 5.3, Banking, in relation to historical disposal)
- collection of water for MAR where a demonstrable excess exists (e.g. excess subsoil drainage water or surface water) – demonstrable excess being only



that portion of water that is not required for maintenance of the hydrological regime or ecological requirements of receiving water bodies

- infiltration or injection of stormwater for MAR from existing drainage systems that normally discharge to the ocean
- infiltration or injection for environmental benefit (that is, without abstraction).

5.2 Activities that will not be considered as MAR

All activities that do not meet the department's MAR definition (refer to policy statement, section 1), including but not limited to:

- recharge and recovery not undertaken in the same or interconnected aquifers – water will be taken from existing groundwater resources and will therefore need to be licensed separately under the allocation limit
- disposal of water through infiltration or injection – this activity does not meet the department's definition of MAR and is regulated by the department through other legislation and by-laws
- re-injection/infiltration of dewatering excess after abstraction – although this activity is a mitigation of the impacts of abstraction, it is a return of dewatering volumes (generally to the same aquifer), not input of additional water, and can therefore not be accounted for outside of the allocation limit as MAR
- water sensitive design that is used to mimic natural hydrological processes in urban and rural developments for the maintenance of the hydrological regime or ecological requirements of receiving water bodies (including infiltration of rainwater into aquifers via systems such as soak wells, infiltration galleries, biofilters, pervious paving, and infiltration areas in parks, garden beds or other vegetated areas)
- land use changes or activities that result in additional groundwater recharge and raise groundwater levels (e.g. urban development, catchment clearing or thinning/burning of vegetation) – if groundwater volumes increase, they should be taken into account when determining or revising the allocation limit for the groundwater resource.

5.3 How MAR operations will work in Western Australia

Source water

- Any source of water may be suitable for MAR, provided the relevant approvals are obtained. Refer to the department's MAR guideline for more information.
- Proponents must consider the impacts of using water from a particular source and obtain approvals for access and use from relevant agencies. The taking of water for the purpose of recharging an aquifer should not adversely impact the environment, water users or public health.



Recharge

- Proponents must demonstrate that the impacts of recharge upon the environment, water users and public health will be acceptable.
- The infiltration or injection of water into an aquifer should not unacceptably impact the quantity or quality of water resources, ecosystems, water users or public health (refer to section 1).
- For proposals without abstraction, proponents must demonstrate the environmental or mitigation benefits of the proposal for it to be considered as MAR.
- Within public drinking water source areas, MAR may be supported with conditions on water and environmental licences if water infiltrated or injected into an aquifer is treated to drinking water standard (see the department's *Strategic Policy: Protecting public drinking water source areas in Western Australia (2016)*), and meets drinking water quality criteria as per the *Australian Drinking Water Guidelines (NHMRC, NRMMC 2011 [2018 update])* and the *Australian Guidelines for Water Recycling: Managing health and environmental risks (Phase 2), Augmentation of drinking water supplies (NRMMC, EPHC, NHMRC, 2008)*.

Recovery

- Where recharge water is to be abstracted for subsequent use, proponents must demonstrate that it will be available for abstraction when required, and that the impacts of abstraction upon the environment, water users and public health will be acceptable.
- Recovery of recharge water will only be allowed after water has been injected or infiltrated. Under some circumstances there will be a requirement for recharge water to remain within the aquifer for an approved amount of time (residence time) before recovery can begin; or for recharge to be undertaken for an approved period before recovery (refer to accompanying MAR guideline – determining the time between recharge and recovery).
- Where there are extenuating circumstances, and an emergency supply of water is required prior to recharge, MAR scheme operators may be allowed to abstract an agreed volume of water prior to recharge. In these circumstances, the proponent must demonstrate that the emergency supply is in the public interest, that recharge will commence within a short period of time, and that the impacts of abstraction on the environment, water users and public health will be acceptable and manageable.
- Recovery volumes must not exceed recharge or banked volumes and must take losses and potential impacts of abstraction into account.
- Any abstraction exceeding recharge volumes will require a separate licence to take water and as this water will be taken from existing water resources, the required volume must be available under the allocation limit.



- Recovery volumes must be estimated as part of the hydrogeological assessment. The department will determine appropriate recovery volumes for licensing purposes based on estimates provided by the proponent in their hydrogeological assessment, as well as other management considerations.

Banking

- Proponents may bank or store recharge water within a suitable aquifer for a period of time, provided they can demonstrate that the water will be available for recovery when required and that the impacts upon the environment, water users and public health will be acceptable and manageable.
- Proponents wishing to bank recharge water must demonstrate in their hydrogeological assessment that the water will be available for recovery when required (e.g. has not discharged to surface waters or flowed offshore).
- The department will determine the allowable period of banking on a case-by-case basis, based on the proponent's hydrogeological assessment and other relevant information.
- Historical recharge that has occurred before the granting of a licence to take water (e.g. from the disposal of treated wastewater via infiltration basins at wastewater treatment plants) will not be considered as banked recharge water that can be recovered, and will not be included in the water entitlement. Proponents must apply for a licence to take water and provide the required supporting information to the department to undertake MAR. Upon issue of the licence to take water, future metered recharge volumes may be recovered as per the licence conditions.

Managing recharge and recovery volumes

- Recharge and recovery operations should ideally be undertaken within the same aquifer to ensure they are hydraulically connected, but may be undertaken in different aquifers that are part of the same groundwater system and interconnected if the net effect on the groundwater system is determined to be acceptable by the department.
- Connection between recharge and recovery operations must be demonstrated by the proponent as part of the hydrogeological assessment of the proposed MAR operations.
- Recharge and recovery volumes will be managed separately to existing allocation limits for water resources since MAR contributes an additional input to a groundwater resource. Allocation limits do not need to be amended as a result of MAR recharge or recovery.
- Recharge and recovery volumes must be metered (or where this is not possible, measured), and must take losses into account (e.g. evaporation from infiltration basins).



MAR management zones

- MAR management zones may be required to facilitate the licensing of bores/works and management of water quality and quantity.
- Proponents must consider the need for a MAR management zone in consultation with the department and, where required, include a proposed management zone in their hydrogeological assessment (refer to the department's MAR guideline for information on defining a management zone).
- The management zone boundary and any sub-zones will be assessed and approved on a case-by-case basis, based on the proponent's hydrogeological assessment, requirements of other agencies, and any other relevant information.

5.4 How MAR will be regulated in Western Australia

- Proponents must obtain all relevant approvals required from each agency before commencing MAR recharge or recovery operations (refer to the department's MAR guideline).
- Proponents must demonstrate that potential impacts of their MAR proposal on the environment⁶, water users and public health⁷ will be acceptable.
- Proponents will be required to demonstrate that they have fully assessed the risks of proposed MAR operations when submitting applications to the department, and that residual risks to the environment, water users and public health are acceptably low.
- The environmental values of aquifers, water resources (including public drinking water sources), ecosystems, water users and public health need to be protected, and must be maintained or enhanced.

Water

- Licensing of MAR operations will not be subject to existing Sub Area boundaries used to manage abstraction of natural groundwater or surface water resources because MAR is managed separately to allocation limits for these water resources. The potential impacts of recharge and recovery will instead be assessed based on the location of injection/infiltration and abstraction sites, the hydraulic connection between these sites, and the extent of the recharge.

⁶ Includes aquifers, groundwater and surface water resources (including public drinking water sources), and ecosystems. See glossary for definition of environment. This policy does not specifically address potential air and noise issues.

⁷ Consideration of public health by the department only applies where approval is required under the *Environmental Protection Act 1986* and all references to public health throughout this policy and accompanying MAR guideline only apply where the *Environmental Protection Act 1986* is applicable.



- To ensure that recharge is maintained, and water is only recovered when a recharge volume is available, the licence to take water will generally be granted to the proponent undertaking the recharge operations.
- In some limited circumstances, the licence to take water may be issued to a third party recovering the recharge water, provided they have legal access to the land from which the water is being recovered, and a contractual agreement is in place with the recharge proponent (e.g. commercial or recycled water supply agreement). The licence applicant will be required to provide a copy of the agreements with their application to take water. The contractual agreement must ensure that:
 - recharge will occur before recovery is undertaken and continue for the duration of the recovery period
 - the recovery volume will not exceed the recharge volume
 - accurate metering data will be provided to the licence applicant to enable them to comply with their licence.
- The holder of the licence to take water may transfer the licence to a person who is eligible to hold a licence and will continue the recharge operations. This permanent transfer of the licence will only be allowed when a property is sold and the new owners demonstrate, to the satisfaction of the department, that the MAR operations will continue.
- The licensee's water entitlement (or part thereof) under the licence to take water may be transferred to a third party for a limited period of time (not exceeding the remaining term of the licence) through an agreement under the *Rights in Water and Irrigation Act 1914*. The licensee's water entitlement under the licence to take water will not be able to be permanently transferred to a third party.

Environment

- MAR proposals that are likely to have a significant effect on the environment should be referred to the EPA under Part IV, Section 38 of the *Environmental Protection Act 1986*. In making its decision, the EPA considers the object and principles of the Act, the environmental objectives for relevant environmental factors, and the environmental significance of the proposal.
- Proponents must ensure that the proposed location and operation of a MAR scheme will not increase the risk of contaminants being abstracted by water supply bores/wells (including those in the MAR scheme) or other water users, or increase the risk of adverse impacts on ecosystems. When planning and locating MAR recharge and recovery works, proponents will need to take into account the spatial distribution of existing groundwater contamination plumes in aquifers, and the location of chemical constituents of potential environmental concern in soils at contaminated sites, to minimise the risk of mobilising and spreading contamination.



- MAR activities that involve treatment of wastewater and/or injection/infiltration of wastewater may be regulated under Part V, Division 3 of the *Environmental Protection Act 1986* if the MAR scheme meets the definition of a prescribed premises (e.g. Category 54 or 85, sewage facility, defined under Schedule 1 of the Environmental Protection Regulations 1987).
- MAR proposals that result in the clearing of native vegetation that is not of an exempt kind, including clearing that is caused by flooding or other changes in groundwater availability, require a clearing permit.

Applications submitted to the department must be supported by additional information to demonstrate that the operation's impacts on the environment, water users and public health will be acceptable and manageable. The department's MAR guideline outlines the approvals and supporting information required for MAR operations.

6. Applicant's right to a review of the department's decisions

An applicant has the right to apply to the State Administrative Tribunal for a review of the department's decision on licences under Section 5C or Section 26D of the *Rights in Water and Irrigation Act 1914*. Refer to the [State Administrative Tribunal's website](#) for further information.

An applicant also has the right to appeal to the Minister for Environment in relation to the department's decisions made under Part V of the *Environmental Protection Act 1986* regarding licences, works approvals and clearing permits, and decisions and reports of the EPA under Part IV of the Act. Refer to the [Office of the Appeals Convenor](#) for further information.



Document custodian and review

The currency of this document will be continuously evaluated and reviewed no later than three years from the date of issue or sooner as required.

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Glossary

Abstraction	The withdrawal of water from any surface water or groundwater source of supply.
Allocation	The volume of water taken from a water source (groundwater or surface water) for use by an individual, usually in accordance with a licence granted under the <i>Rights in Water and Irrigation Act 1914</i> .
Allocation limit	Annual volume of water set aside for consumptive use from a water resource.
Aquifer	A geological formation or group of formations capable of receiving, storing and transmitting significant quantities of water. Usually described by whether they consist of sedimentary deposits (sand, gravel, sandstone) or fractured rock. Aquifer types include unconfined, confined and artesian.
Artesian aquifer	A confined aquifer in which the hydraulic pressure is sufficient to cause water to rise above the land surface in a well/bore or spring.
Banking	The storage of recharge water in the aquifer for a period of time so that it can be recovered when required. The term banking is synonymous with storage.
Bore	A small-diameter, normally vertical hole, usually drilled with machinery to obtain access to underground water for monitoring, injection or abstraction purposes. Referred to as a 'well' in the <i>Rights in Water and Irrigation Act 1914</i> .
Confined aquifer	An aquifer saturated with water which is under pressure because it is situated between relatively impervious layers.
Ecological water requirement	The water regime needed to maintain the current ecological values (including assets, functions and processes) of water-dependent ecosystems consistent with the objectives of an environmental flow study.
Ecosystem	A term used to describe a specific environment (e.g. a lake), including all of the biological, chemical and physical resources and the inter-relationships and dependencies that occur between those resources.
Environment	Living things, their physical, biological and social surrounding and interactions between all of these (refer to the <i>Environmental Protection Act 1986</i>).
Environmental values	Environmental values are particular values or uses of the environment that contribute to a healthy ecosystem, or public or private benefit, welfare, safety or health and which require protection from the effects of pollution, waste discharges and deposits (refer to the <i>Environmental Protection Act 1986</i>).



Groundwater	The water that occurs in pore spaces and fractures in soil and rock beneath the ground surface.
Groundwater Area	An area defined for the purpose of managing groundwater resources in Western Australia. Groundwater Areas are subdivided into Sub Areas (see below).
Groundwater-dependent ecosystem	An ecosystem that depends on groundwater for its existence and health.
Infiltration	Where fluids make their way under gravity to the water table over time. Only infiltration activities intended to recharge an aquifer and that meet the department's MAR definition will be considered as MAR. Only the volume of water that enters the aquifer within a suitable time period for the MAR project will be considered as infiltrate. This must be demonstrated by the proponent in their hydrogeological assessment.
Injection	Pumping of water into an aquifer under pressure via a bore/well.
Public drinking water source area	The area from which water is captured to supply drinking water. It includes all underground water pollution control areas, catchment areas and water reserves constituted under the <i>Metropolitan Water Supply, Sewerage, and Drainage Act 1909</i> or the <i>Country Areas Water Supply Act 1947</i> .
Recharge	All water reaching the saturated part of an aquifer (through natural or artificial means), such as rainfall recharge, managed aquifer recharge, induced recharge from other aquifers or through-flow.
Recharge water	Water that is infiltrated or injected into an aquifer to intentionally recharge the aquifer.
Recovery	Retrieval of recharge water infiltrated or injected as part of a MAR operation, via abstraction, usually from a bore or well.
Stormwater	Water that flows over ground surfaces and in natural watercourses and drains, as a direct result of rainfall over a catchment. Stormwater consists of rainfall runoff and any material (soluble or insoluble) mobilised in its path of flow.
Sub Area	A subdivision within a Groundwater Area, defined for the purpose of managing the allocation of groundwater resources. Sub Areas are not proclaimed and can therefore be changed internally without being gazetted.
Water entitlement	The quantity of groundwater permitted to be abstracted by a licence to take water under the <i>Rights in Water and Irrigation Act 1914</i> , usually specified in kilolitres/year (kl/year).
Well	An opening in the ground made or used to obtain access to underground water. This includes soaks, wells, bores and excavations.



References and further reading

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