



## Water quality protection note 13

November 2012

Looking after all our water needs

# Dewatering of soils at construction sites

## Purpose

The note advises on how to minimise harmful effects from soil dewatering on water resources and dispose of excess groundwater. Potential problems include:

- contamination of waters used for agricultural or domestic water supplies or recreation (if an extracted discharge contains pesticide, petroleum hydrocarbon or solvent residues)
- excessive change to levels of nearby surface water bodies, harming their ecology and vegetation
- lowering of the standing water table in water supply bores
- mobilisation of nutrient-rich water into surface water bodies, increasing nitrogen and phosphorus loads that may lead to algae growth problems
- reduction of dissolved oxygen in waterways
- toxic metals and arsenic release due to the disturbance of acid sulfate soils (ASS)
- turbidity and sedimentation in surface waters.

The Department of Water is responsible for managing and protecting the state's water resources. It is also a lead agency for water conservation and reuse. This note offers:

- our current views on dewatering near sensitive water resources ([Appendix A](#))
- guidance on acceptable practices used to protect water resources quality
- a basis for the development of a multi-agency code or guideline which balances the views of industry, government and the community, while sustaining healthy waters.

Appendices provide additional advice relevant to this note, including:

- A. Information on sensitive water resources, note limitations and updates
- B. Relevant statutes and administering agencies
- C. Key data we need to support project assessments
- D. A checklist of information to support a licence application for dewatering purposes under the *Rights in Water and Irrigation Act 1914*
- E. Indicative quality criteria for dewatering discharge to receiving waters, followed by references, note disclaimer and how to provide feedback.

## Scope

This note applies to short-term dewatering operations that remove water from groundwater seepage, excavations that intersect aquifers or pits flooded by storm events.

Our main purpose is to guide the environmental management of dewatering at construction sites and during the installation of buried structures and services, however aspects can be used to guide other operations (such as seasonal agricultural land drainage and waters pumped from quarries).

This note does not cover:

- Dewatering projects exceeding one year’s duration. Specific advice about mine-site dewatering is available in the *Water quality protection guidelines – mining and mineral processing* (reference 4a).
- soil dewatering that occurs via constructed agricultural drains intercepting the water table
- dewatering that may disturb ASS<sup>#</sup>
- temporary bores provided solely for soil or groundwater investigations
- oil, gas or thermal energy industry bores.

# Special provisions apply to dewatering at contaminated sites and those affected by acid sulfate soils. Development proposals that may involve these settings should be referred to the Department of Environment and Conservation’s Contaminated sites branch in Perth (reference 3c).

## Advice and recommendations

### Planning to dewater soil

- 1 Prior to installing dewatering equipment, a comprehensive assessment of the potential environmental impacts of dewatering should be undertaken. This assessment should highlight environmental risks and propose management strategies to overcome any significant environmental issues (see Appendices C and D).
- 2 The environmental assessment should:
  - a Describe the dewatering technique (such as ‘spears’ connected to a pump manifold, bore-field, or pit and sludge pump).
  - b State the intended commencement date, dewatering duration, flow rate and frequency of dewatering discharge.
  - c Detail the properties and dependencies of local waters (before dewatering), including the following:
    - seasonal standing groundwater levels
    - soil types and their hydrogeology
    - comprehensive groundwater quality indicators
    - the water values at risk near the dewatering site
    - the water values at any planned water discharge point.

For projects in the Perth region, the *Perth Groundwater Atlas* provides indicative information on the water table, see online information at <[www.water.wa.gov.au](http://www.water.wa.gov.au)> select *Tools and data > Maps, and atlases*. For other regions, select our *Hydrogeological atlas*, or contact our information services in Perth to obtain available data.

- d Show the profile and radius of influence of any watertable draw-down cone calculated via scientific modelling (including threat to any vegetation or existing structures from land movement) under the supervision of an experienced hydrogeologist. Empirical methods of impact estimation may be used for small projects of short duration.
  - e Advise on any proposed measures to limit the offsite influence of the dewatering, such as scheduling start of dewatering at the end of the dry season, sheet-piling, hydraulic barriers, grout curtains or ground-freezing.
  - f Describe the quality of dewatering liquid (determined by bore sampling and analysis or using recorded data), including contaminant concentrations, with parameters selected based on natural groundwater contaminants and/or the local land use history.
  - g Evaluate the need for treatment of the extracted water and its viability before release to the environment, including aeration, chemical flocculation, filtration, odour control, pH adjustment and/or sedimentation.
  - h State the risks of disturbing acid sulfate soils when dewatering. The West Australian Planning Commission's *Acid sulfate soil planning guidelines* (reference 9) provide relevant information. Acidic conditions can be produced when natural sulfide minerals, predominantly iron sulfide (pyrite) in the soil are exposed to air after the water table is lowered. This can result in the release of toxic metals into groundwater. Dewatering should not take place unless effective measures are used to prevent soil acidification. For more information, see references 3b, 3c and contact the Department of Environment and Conservation's Contaminated sites branch.
  - i Detail the discharge consent conditions set by regulatory authorities such as the Minister for the Environment, Swan River Trust, Department of Environment and Conservation or local government. In the absence of specified discharge quality, the quality of dewatering fluid discharged to the environment should consistently comply with the indicative criteria provided in Appendix E. Alternative discharge criteria may be proposed by the proponent for assessment, supported by detailed site-specific scientific studies
  - j Summarise the results of consultation with any local residents or businesses likely to be affected during dewatering. A contact person (representing the business or agency conducting the dewatering) should be available during the operational period to manage any issues.
- 3 Dewatering discharges to the environment should not result in any of the following impacts:
- a loss of any existing environmental value linked to receiving waters
  - b pose a significant threat to aquatic fauna or flora, especially in sensitive environments, [see Appendix A](#)
  - c soil erosion or local flooding
  - d harm to native vegetation (via flooding or toxicity)
  - e erosion of structures or services

- f sediment build-up in drains, waterways or wetlands
  - g significant change of pH in soil, surface waters or groundwater
  - h leaching of contaminant concentrations likely to harm downstream water values
  - i nuisance to the local community such as foul odours; harm to plants or property
  - j hazard to human health or safety
  - k loss or discernible reduction of flow in public or private water sources.
- 4 The proponent should prepare and implement appropriate management strategies to address any environmental issues arising during the operation of the dewatering project. This should include design measures to minimise the impact of local stormwater on the dewatering operation. Government regulatory approvals, and controls that apply to dewatering, are summarised in the table in Appendix B.
  - 5 Dewatering near coastal or estuarine environments should not draw saltwater into a less saline aquifer. The likelihood of disturbing acid sulfate soils is high in these environments, so effective risk management is necessary.
  - 6 A groundwater licence is required for dewatering in proclaimed *groundwater areas* (see Appendix B and D). For detailed information, see <[www.water.wa.gov.au](http://www.water.wa.gov.au)> select *Doing business with us > water licensing* or contact our nearest office.

#### Options for disposal of water

- 7 Dewatering disposal options (to minimise environmental harm) are listed in preferred order as follows:
  - a *Recharge of local groundwater*, provided:
    - the quality of the extracted water meets the relevant criteria set by regulatory agencies (Appendix B), it's quality is compatible with maintaining the uses of local waters (reference 1c or 1d) or conforms to the indicative criteria given in Appendix D
    - there is sufficient area and aquifer capacity to recharge, without risk to native vegetation, wetlands, structures or services
    - silt, clay, organic material or precipitates in dewatering flows will not clog the recharge area
    - the dewatering fluid does not degrade soil or the quality of water resources
    - the discharge will not lead to local flooding or adverse land surface impacts.
  - b *Recycling*, provided the water quality is suitable for its intended use. Recycling options include dust control, process circuit water, cooling water systems or wash-down water. The reuse activity must also be acceptable to the Department of Health and the relevant local government authority.
  - c *Irrigation of vegetated land* provided the water quality meets the *Australian and New Zealand guidelines for fresh and marine water quality 2000*, chapter 4.2 criteria for irrigation (reference 1c). The proponent should also demonstrate that the watering regime meets the seasonal evapo-transpiration needs of the irrigated vegetation, and has no adverse environmental or social impacts.

- d *Water use off-site* by pumping or carting, provided a written agreement is negotiated with the owner of the selected site to provide water for a specific need. The reused water quality should consistently meet the quality criteria appropriate for the intended use. The off-site use must also be acceptable to the Department of Health and the relevant local government authority.
- e *Discharge into nearby waterways*, provided:
  - the water quality meets the indicative criteria set by regulatory authorities; the default criteria in [Appendix E](#), or other approved alternative site specific criteria
  - written approval is received from the owner/operator of any drainage systems used to convey the dewatering discharge, such as the Water Corporation for main drains and local government authorities for local drains
  - approval is given by relevant state government agencies including the Departments of Environment and Conservation, Health and Water in their managed areas, and meets local government planning and environmental health requirements
  - discharge into drains entering the Swan or Canning rivers conforms to the Swan River Trust's dewatering policy
  - the discharge into a waterway within any area managed under the *Waterways Conservation Act 1976* (e.g. Albany Waterways, Avon River, Leschenault Inlet, Peel-Harvey Inlet and Wilson Inlet management areas) is approved by this department.
- f *Storage* in a pond for reuse or disposal by controlled seepage.
- g *Solar evaporation* disposal in a lined containment basin.

#### Constraints on disposal of dewater

- 8 This department will generally oppose any dewatering discharge that:
  - a flows into *conservation category* or *resource enhancement* wetlands listed in the *directory of important wetlands*, *environmental protection policy*, *Ramsar convention* or *register of the national estate*; unless approved in writing by the Department of Environment and Conservation
  - b enters poorly defined waterways where the dewatering fluids could flood adjoining land and vegetation
  - c is likely to compromise the values (beneficial uses) of any surface water or groundwater resource. The National water quality management strategy guidance papers offer detailed information on these values and their protection ([references 1c & 1d](#))
  - d is likely to cause any of the adverse environmental impacts previously described in this note.
- 9 Discharge options may be considered on a site-by-site basis. Proposals should be referred to our nearest regional office for assessment and advice, including the information described in *Planning to dewater*.

## Operation and management

- 10 Where the extracted water may contain significant suspended solids, cause turbidity in receiving waters or be of variable quality, the proponent should install and operate a settling basin or balance tank with capacity to contain a minimum of two hours of dewatering flow prior to discharge.
- 11 Settling basins should effectively remove floating matter, allow effective aeration and permit dissolved iron to precipitate and settle. Where extracted water has a pH of less than 6 and titrated acidity exceeds forty milligrams/litre, it may be necessary to dose water with an alkali (such as lime) to raise the pH to at least 6.5, and artificially aerate the water to promote the precipitation of metal oxides.
- 12 Where water retention on-site is not practical due to a lack of space, other forms of solids reduction should be used (such as filtration through geo-fabric or hay bales).
- 13 If appropriate treatments should be considered such as chemical dosing with metal salts to reduce fine suspended solids, followed by settling.
- 14 Disinfection should be used if the extracted water contains micro-organisms (such as where dewatering takes place near animal holdings or sewage disposal systems).
- 15 The dewatering should not result in changes to the water table, water quality or hydrology that may cause significant adverse effects on neighbouring properties or water resources.
- 16 Any incidental detrimental effects on people, property or water bodies should be immediately and effectively remedied by the dewatering system operator
- 17 Contingency plans and resources should be available to deal with equipment malfunctions, storm events, contamination incidents, vandalism and emergency situations that may pose a risk to the local environment.

## Monitoring and reporting

- 18 The dewatering system operator should carry out monitoring as follows:

<b>What is monitored?</b>	<b>Frequency</b>
Dewatering discharge rate during the works (using a water meter)	Continuous
Physical parameters (after treatment), including pH, electrical conductivity, dissolved oxygen, total titrated acidity/ alkalinity and turbidity at the settling tank/ pond overflow	Weekly, from start of dewatering
Static water levels in the surrounding watertable via piezometers to assess draw-down effects (and any impacts on structures)	Fortnightly
Site-specific chemicals (after treatment) such as salts and metals and biological parameters using a laboratory accredited by the National association of testing authorities	Monthly, from start of dewatering
Impacts on vegetation and water resources by conducting investigations over time, including pre-start and at completion of dewatering.	Six-monthly intervals

19 Monitoring program records and results should be retained for up to two years, for inspection or reporting as required by government agencies.

## Appendix A: Information on sensitive water resources, note limitations and updates

### Sensitive water resources

Our water resources sustain ecosystems, aquatic recreation and aesthetic values as well as providing drinking, industry and irrigation supplies. Along with breathable air, uncontaminated water is essential for viable communities. Natural water resources should remain within defined quality limits to retain their ecological, social and economic values. Hence they require appropriate protection measures to minimise contamination risks.

Information on water quality parameters and processes to maintain water values are published in the Australian Government's national water quality management strategy papers. These papers are available online at <[www.environment.gov.au](http://www.environment.gov.au)> select *water* > *water policy and programs* > *water quality*.

The Department of Water strives to improve community awareness of catchment protection measures (for both surface water and groundwater) as part of a multi-barrier protection approach to sustain acceptable water resource quality. Human activity and many land uses pose a risk to water quality if contaminants in significant quantities are washed or leached into water resources.

Sensitive waters include estuaries, natural waterways, wetlands and groundwater. These waters support one or more of the environmental values described below.

### Public drinking water sources

#### *Overview*

Public drinking water source area (PDWSA) is the collective name given to any area proclaimed to manage and protect a community drinking water source. PDWSA include underground water pollution control areas, water reserves and catchment areas administered by the Department of Water under the provisions of the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or the *Country Areas Water Supply Act 1947*.

For online information on the location of PDWSA, see < [www.water.wa.gov.au](http://www.water.wa.gov.au) > select *tools and data* > *maps and atlases* > *geographic data atlas*, then open *environment* > *public drinking water source areas*.

Within PDWSA, priority areas are defined (P1, P2 or P3) via publicly consulted drinking water source protection plans or land use and water management strategies. Priority areas are used to guide land planning, rezoning and development approval processes. Priority areas are assigned considering the current local planning scheme zoning, land tenure, the water source's strategic value and its vulnerability to harm. Each priority area is managed using a specific risk-based strategy to provide for effective water resource protection.

The Department of Water develops these documents in consultation with other government agencies, landowners, industry and the community.

P1 areas are defined to ensure human activity does not degrade a water source. These areas are declared over land where the provision of high-quality drinking water for public use is the primary beneficial land value. P1 areas typically cover land controlled by the state government or one of its agencies. These areas are managed under the principle of *risk avoidance*, so most land development and human activity is normally opposed.

P2 areas are defined to ensure there is *no increased risk of pollution* to the water source once a source protection plan has been published. These areas are declared over land where low-intensity development exists (involving rural usage such as dry land grazing or cropping). Protection of public water supply sources is a high priority in P2 areas. These areas are managed in accordance with the principle of *risk minimisation*, and so the intensity of development should be restricted (via management conditions) and activities with a low water contamination risk are normally considered acceptable.

P3 areas are defined to *manage the risk of pollution* to the water source. These areas are declared over land where public water supply sources must co-exist with other land uses such as residential, commercial and/or light industrial development. Protection of P3 areas is mainly achieved through land use management measures e.g. contamination barriers. Environmental guidance (such as these notes) or site-specific development approval conditions are used to limit the water resources contamination risk from the land use or activity. If, however, the water source becomes contaminated, then water supplied from P3 sources may need to be more intensively treated or an alternative water supply source commissioned.

Additional protection zones are defined close to the point where drinking water is extracted or stored. These zones are called *wellhead protection zones (WHPZ)* and *reservoir protection zones (RPZ)*. Statutory land use constraints apply to activities within these zones surrounding sources to safeguard these waters most vulnerable to contamination.

WHPZ are assigned around water production wells based on hydrological factors. Statutory land use restrictions apply within these zones as groundwater moves rapidly towards wells due to aquifer depressurisation by pumping. Any contaminants leaching from the ground surface in a WHPZ could rapidly migrate into scheme water supplies (before effective remedial action can occur). In sedimentary basins, WHPZ are usually circular, with a radius of 500 metres in P1 areas and 300 metres in P2 and P3 areas. These zones do not extend outside PDWSA boundaries.

RPZ are defined over and around public water supply storage or pipe-head reservoirs. Statutory access and land use restrictions apply in RPZ. The aim is to restrict the likelihood of contaminants being deposited or washing into water sources in any runoff. RPZ are normally within state-controlled areas encompassing land up to two kilometres measured outward from the reservoir top water-level and include the inundated area when the reservoir is full.

For additional explanatory information on PDWSA, see our Water quality protection note (WQPN) 25 *Land use compatibility in public drinking water source areas*, WQPN 36

*Protecting public drinking water source areas, WQPN 75 Proclaimed public drinking water source areas, note 76 Land use planning in PDWSA and WQPN 77 Risk assessment in PDWSA.* These notes are available online at <[www.water.wa.gov.au](http://www.water.wa.gov.au)> select *publications* > *find a publication* > *series browse*.

#### *Established activities within PDWSAs*

Many land use activities were approved and established before publication of a source protection plan or land use and water management strategy.

Activity operators should ensure that modern environmental facilities and practices are progressively implemented and maintained so that the water resource contamination risk is minimised (within practicable and economic constraints).

#### *New or expanded activities in PDWSA*

Any development proposals that could affect a drinking water source should be referred to this department's local regional office with detailed supporting information for an assessment and written response.

The development proposal may be:

- approved (with or without conditions)
- delayed pending receipt of additional information before a decision is made; or
- opposed due to a statutory or policy conflict or inadequate protective measures provided to safeguard the water source.

To assist the assessment, operators should demonstrate that under all operating conditions the facilities and processes used on-site do not pose a significant water contamination risk.

#### *Buffers to water supply sources*

Native vegetation buffers should be used to separate compatible land use areas from the sources of drinking water including the full supply margins of reservoirs, their primary feeder streams and/or production bores. Advice on suitable buffer forms and dimensions is provided in our WQPN 6 *Vegetated buffers to sensitive water resources*.

#### *Within clearing control catchments*

Controls on vegetation clearing for salinity management in country areas are provided under part IIA of the *Country Areas Water Supply Act 1947*.

These controls apply in the Wellington Dam, Harris River Dam, Mundaring Weir and Denmark River catchment areas and the Kent River and Warren River water reserves.

Details of clearing controls may be obtained from our regional offices, see online information at <[www.water.wa.gov.au](http://www.water.wa.gov.au)>, select *Contact us*.

#### **Private water supply sources**

Private water sources vulnerable to contamination include:

- drinking water sources for people or domesticated animals

- commercial or industrial water supply sources (requiring specific qualities that support activities such as aquaculture, cooling, food and mineral processing or crop irrigation)
- urban or municipal irrigation sources (where water quality may affect vegetation performance or people's health and wellbeing).

### Underground ecosystems

Important underground ecological functions that may be at risk of contamination include groundwater- and cave-dwelling animals and microorganisms (generally located within soils that have open pore spaces such as sand, gravel and limestone).

### Waterway ecological and social values

Waterways that have high social and conservation significance are described in the Western Australian Environmental Protection Authority (EPA) Guidance statement 33 *Environmental guidance for planning and development*, section B5.2.2. This statement is available online at <[www.epa.wa.gov.au](http://www.epa.wa.gov.au)> select *policies and guidelines* > *environmental assessment guidelines* > *guidance statements*.

The Department of Water manages natural waterways under Section 9 of the *Water Agencies (Powers) Act 1984* and the *Rights in Water and Irrigation Act 1914*. For online information, see <[www.water.wa.gov.au](http://www.water.wa.gov.au)> and select *managing water*. Apart from aquatic ecosystems and water sources, waterways provide social values including aesthetic appeal, drainage pathways and recreational opportunities for watercraft use, fishing, tourism, swimming and related aquatic activities. Engineered drains and constructed water features are normally not assigned ecological values because their primary function and operational factors outweigh their ecological value.

This department also administers the *Waterways Conservation Act 1976* which defines Western Australian waterways subject to specific regulatory controls. Currently proclaimed waterways include the Avon River, Peel-Harvey Inlet, Leschenault Inlet, Wilson Inlet and Albany waterways management areas.

### Within the Swan-Canning Estuary catchment

The Swan River Trust is responsible for the protection and management of the Swan-Canning River system. The Trust safeguards ecological and social values under the *Swan and Canning Rivers Management Act 2006*. Written approval is needed for any land- or water-based development within the Swan, Canning, Helena or Southern Rivers and their associated foreshore areas within the *Swan River Trust development control area (DCA)*. Human activity and development close to these areas are likely to have an effect on the waters of the river system. Development proposals within or abutting the DCA should be referred to the Trust for assessment.

Developments outside the DCA, but near river tributaries or drainage systems should also be referred to the Trust for assessment and advice. This is because water quality within the area may be affected by chemicals leached into groundwater flow. For detailed information, see online advice at <[www.swanrivertrust.wa.gov.au](http://www.swanrivertrust.wa.gov.au)>, phone 9278 0900 or email: [planning@swanrivertrust.wa.gov.au](mailto:planning@swanrivertrust.wa.gov.au).

## Wetland ecology

Many important wetlands have been given conservation status under the Ramsar convention (described online at <[www.ramsar.org](http://www.ramsar.org)>), Japan and Australia migratory bird agreement (JAMBA), China and Australia migratory bird agreement (CAMBA), and Republic of Korea and Australia migratory bird agreement (ROKAMBA).

Wetlands are also protected under various national and Western Australian government policies. Conservation wetland data to guide land planning and development activities is provided via the following publications:

- *Directory of important wetlands in Australia* defines wetlands scheduled by the Australian Government. It is available online at <[www.environment.gov.au](http://www.environment.gov.au)> select *water > water topics > wetlands*.
- Wetlands with defined high conservation significance are described in the EPA (WA) guidance statement 33 *Environmental guidance for planning and development* (section B4.2.2). This statement is available online at <[www.epa.wa.gov.au](http://www.epa.wa.gov.au)> select *policies and guidelines > environmental assessment guidelines > guidance statements*.

The Department of Environment and Conservation (DEC) is the custodian of the state wetland datasets, and is responsible for maintaining and updating relevant information. These datasets are available online at <[www.dec.wa.gov.au](http://www.dec.wa.gov.au)> search *maps wetlands* or select *management and protection > wetlands > wetlands data*. Guidance on viewing the wetlands is provided online at *water > wetlands > data* or by phoning DEC's nature conservation division on 9334 0333.

Wetlands datasets identified for conservation value or for resource enhancement include:

- *Geomorphic wetlands of the Swan Coastal Plain*
- *South coast significant wetlands*
- *Geomorphic wetlands Augusta to Walpole* (this dataset awaits detailed evaluation).

Wetlands that are highly disturbed by land use, or have been landscaped to provide a social amenity or drainage control function in urban settings, may not be assigned conservation values unless they are actively managed to maintain these values.

### Note limitations

Many Western Australian aquifers, waterways and wetlands await detailed scientific evaluation, present data on their quality is sparse and their values remain unclassified. Unless demonstrated otherwise, any natural waters that are slightly disturbed by human activity are considered to have sensitive environmental values. Community support for these water values, the setting of practical management objectives, provision of sustainable protection services and effective implementation are vital to protecting or restoring water resources for both current needs and those of future generations.

This note provides a general guide on environmental issues, and offers solutions based on data searches, professional judgement and precedents. Recommendations made in this note do not override any statutory obligation or government policy statement. Alternative practical environmental solutions suited to local conditions may be considered.

This note's recommendations shall not be used as this department's policy position on a specific matter, unless confirmed in writing. In addition, regulatory agencies should not use this note's recommendations in place of site-specific development conditions based on a project's assessed environmental risks. Any regulatory conditions should consider local environmental values, the safeguards in place and take a precautionary approach.

Where a conflict arises between this note's recommendations and any activity that may affect a sensitive water resource, this note may be used to assist stakeholder negotiations. The negotiated outcome should not result in a greater water quality contamination risk than would apply if the recommended protection measures were used.

### Water quality protection note updates

This note will be updated as new information is received, industry/activity standards change and resources permit. The currently approved version is available online at <[www.water.wa.gov.au](http://www.water.wa.gov.au)> select *publications* > *find a publication* > *series browse* > *water quality protection notes*.

### Appendix B: Statutory approvals relevant to this note include-

<b>What's regulated?</b>	<b>West Australian statutes</b>	<b>Regulatory body/ agency</b>
Regulation of prescribed premises that could pollute;  Prohibition of sediment discharge	<i>Environmental Protection Act 1986- Part V regulations</i>  <i>Environmental Protection (Unauthorised Discharge) Regulations 2004</i>	Department of Environment and Conservation <a href="http://www.dec.wa.gov.au">www.dec.wa.gov.au</a>
Licence to take surface water and groundwater from proclaimed areas	<i>Rights in Water and Irrigation Act 1914</i>	Department of Water - regional office <a href="http://www.water.wa.gov.au">www.water.wa.gov.au</a> select <i>Contact us</i>
Dewatering in public drinking water source areas (PDWSA).	<i>Metropolitan Water Supply, Sewerage and Drainage Act 1909</i>  <i>Country Areas Water Supply Act 1947</i>	
Licence to discharge waters into managed waterways.	<i>Waterways Conservation Act 1976</i>	
Approval to discharge into local drains	Local Government Act 1995 by-laws	Local government authority (council)
Impact of significant development proposals on the values and ecology of land or natural waters	<i>Environmental Protection Act 1986 -Part IV</i>  Environmental Impact Assessment	Minister for the Environment advised by the Environmental Protection Authority <a href="http://www.epa.wa.gov.au">www.epa.wa.gov.au</a>
Discharges into the Swan-Canning Estuary	<i>Swan and Canning Rivers Management Act 2006</i>	Swan River Trust <a href="http://www.swanrivertrust.wa.gov.au">www.swanrivertrust.wa.gov.au</a>

<b>What's regulated?</b>	<b>West Australian statutes</b>	<b>Regulatory body/ agency</b>
Approval to discharge water into main drainage systems.	<i>Metropolitan Water Supply, Sewerage and Drainage Act 1909</i> <i>Land drainage Act 1925</i>	Water Corporation www.watercorporation.com.au
Discharge to sewer (industrial waste permit)	<i>Metropolitan Water Supply, Sewerage and Drainage Act 1909; Country Towns Sewerage Act 1948</i>	Water Corporation; other designated water services provider
Subdivision of land  Land zoning and development approval	<i>Planning and Development Act 2005</i>	Western Australian Planning Commission; Department of Planning www.planning.wa.gov.au Local government (council)

Relevant statutes are available from the State Law Publisher at < [www.slp.wa.gov.au](http://www.slp.wa.gov.au) >

## Appendix C: Information needed to assess dewatering proposals

The following information should be supplied to us for assessment with any proposal for dewatering that might impact on sensitive water resources:

- 1 Site owner and operating tenant's name and contact details.
- 2 A site plan showing the location of the project with clearly labelled lot numbers and roads. The plan should show the site topography, remnant vegetation cover, existing infrastructure and onsite water features and sources.
- 3 Details of site investigation of soil strata, depth to water table and available data on the hydrology and quality of local water resources.
- 4 Land use zoning (from the present local government council).
- 5 Current land use description, any site contamination history and its remediation.
- 6 Full description and scale of the activities planned for the project site, (infrastructure, site amenities, and chemical applications), dewatering facilities and planned operational life of the project. Describe intended start date, operating hours and any expansion options.
- 7 Details of any proposed vegetation clearing, environmental buffers, site earthworks and relevant services including sewerage and drainage.
- 8 Description of hazardous materials and chemicals stored or handled on site in commercial quantities.
- 9 Description of the types, quantities and quality of solid and liquid waste (if applicable) that will be generated or disposed from the facility.
- 10 Description of planned material containment, waste management (treatment and disposal); with an environmental management plan (where applicable).
- 11 Details of any environmental modelling conducted to demonstrate the effects of the project on local water resources.
- 12 Planned operational safeguards and equipment maintenance procedures.

13 Details of any contingency measures proposed to minimise the impacts of chemical spills and safely dispose of contaminated waters that may result from non-conforming groundwater quality, storms, fire, flood or equipment malfunction or vandalism. Contingency information should include workforce training, site monitoring and emergency response facilities.

14 Any project contractual agreements or regulatory approvals received.

For major projects, development proponents should engage the services of a qualified and experienced consultant to professionally prepare their development proposal. This should ensure that government agencies can efficiently assess and respond to the proposal without delays caused by inadequate or poorly defined information.

## Appendix D: Additional information required for a dewatering proposal associated with a groundwater licence

The following information may be requested by the Department of Water to process a licence application for dewatering, (where the dewatering activity is not exempt), under the *Rights in Water and Irrigation Act 1914*.

This information will be used by the department to complete the licence assessment. Depending on the outcome of the preliminary assessment, additional information or a dewatering operating strategy may be requested.

*Note: We advise that the applicant also seek advice on any dewatering disposal methods from the Department of Environment and Conservation and where relevant, the Swan River Trust.*

Depending upon the size and location of the dewatering operation some or all of this information may be requested. Proponents should contact their local Department of Water office to find out which items from the checklist they need to supply with their licence application.

If there is insufficient room, please include additional information as an attachment.

What is the purpose of dewatering (e.g. basement construction, quarrying, service installation, pump station)?

When is dewatering scheduled to commence? \_\_\_\_\_

Who is the dewatering contractor? \_\_\_\_\_

What is the duration of pumping? \_\_\_\_\_

Proposed pumping rates, frequency, and total volume of water to be pumped daily (kL)

Proposed dewatering method (e.g. spears, well point systems, open pumping)

Support techniques (e.g. horizontal boring, sheet piling, grouting)

Maximum depth of excavation below natural ground surface

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Maximum depth the water table is to be lowered to during dewatering \_\_\_\_\_metres

Water table depth pre-dewatering \_\_\_\_\_ metres

Groundwater drawdown cone: radius of impact \_\_\_\_\_ metres; depth \_\_\_\_\_metres

Discharge point (e.g. infiltration or recharge to local aquifer, dust suppression/irrigation, sewer, drain or surface water body):

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Have any acid sulphate soils been identified at the site? No/Yes

*If yes, have you contacted the Department of Environment and Conservation for the appropriate approvals and advice?* No/Yes

Acid sulfate soil management plan sent to the DEC for assessment? No/Yes

*If yes, it been approved by the Department of Environment and Conservation?* No/Yes

Dewatering effluent treatment description (e.g. nil, aeration, lime neutralisation, sediment filtration or settlement, chemical contaminant removal):

---

Identify any potentially sensitive receptors (e.g. wetlands, water bodies, other ground water users)

---

Copy of the sample analysis of groundwater quality pre-dewatering attached.

Monitoring program attached (how, where, what is tested, how often, by whom?)

Contingency program attached (e.g. protection of structures against movement, nearby bore supplies, flooding, salt water intrusion and ecosystem protection)

Detailed site map attached (services, dewatering/ discharge locations, and receptors).

SIGNED: \_\_\_\_\_ DATE: \_\_\_\_\_

## Appendix E: Indicative quality criteria for dewatering discharge to receiving waters

This may be used as the default criteria where no regulatory agency discharge criteria is available.

Quality indicator	Limiting criteria for receiving waters <sup>a, b</sup>	
<b>pH</b>	Causes the seasonal background pH to vary within $\pm 0.5$ units. <sup>c</sup>	
<b>Colour/ odour</b>	Causes no discernible variation from seasonal background colour or odour.	
<b>Dissolved solids (TDS)</b>	Causes a maximum increase in the seasonal background TDS of 10 per cent. <sup>d</sup>	
<b>Dissolved oxygen (DO)</b>	Causes a maximum decrease in the seasonal background DO concentration of 10 per cent.	
<b>Floating matter/ foam</b>	Causes no visible floating oil, foam, grease, scum, litter or other objectionable matter.	
<b>Non filterable residue (NFR) retained on a 45 micron filter</b>	Causes a maximum increase in the seasonal background NFR concentration of 10 per cent. Field check: a black Secchi disc should be immediately visible in daylight at bottom of 85 centimetres depth of dewatering liquid placed in a clean 200 L drum with a white floor.	
<b>Sediment</b>	Causes no discernible deposition of sediment that may affect aesthetic, recreational, ecological or other values.	
<b>Micro-organisms</b>	As accepted by Department of Health or its delegate, with reference to the relevant National water quality management strategy (NWQMS) paper 4 and 6 (see references 1c and 1d)	
<b>Nutrients</b> (i.e. plant-available nitrogen or phosphorus)	Likely to cause a maximum increase in seasonal background nutrient levels of 10 per cent <sup>c</sup> (where background data is available; and For conservation-valued waterways or wetlands, causes the seasonal background nutrient levels not to exceed the relevant default trigger level value in NWQMS paper 4 Tables 3.3.4 or 3.3.6	
<b>Toxicants</b> (including- arsenic, cyanide, endocrine disrupters, heavy metals, pesticides)	Causes a maximum increase in the seasonal background concentration of any toxicant of 10 per cent; and a maximum rise in the receiving water's seasonal background concentration of any toxicant to the lesser value of: <ul style="list-style-type: none"> <li>- 75 per cent of the NWQMS paper 4 or 6 investigation trigger value/ guideline criterion for relevant water uses</li> <li>- criterion for protection of 90 per cent of existing ecosystem species given in NWQMS paper 4</li> </ul>	
<b>Temperature</b>	Causes a maximum seasonal change to water temperature of two degrees Celsius when measured at mixing zone boundary	
<b>Radionuclides</b> (based on maximum activity levels)	<i>Non specific radiation emitters:</i>	
	Gross alpha <sup>e</sup>	0.1 Becquerel (Bq)/ L
	Gross beta <sup>e</sup>	0.5 Bq/ L (Potassium 40 subtracted)
	Unspecified alpha and beta-emitters	Annual human water intake of 0.1 milli-Sievert for any individual nuclide

Quality indicator	Limiting criteria for receiving waters <sup>a, b</sup>	
Radionuclides (based on maximum activity levels)	Specified radiation emitters:	
	Radium 226	0.5 Bq/L
	Radium 228	0.5 Bq/L
	Uranium	0.2 mg/L (equivalent to 0.25 Bq/ L)
	Radon 222	100.0 Bq/L

#### Footnotes on limiting criteria for receiving waters

- a Any variation from the seasonal background quality levels should be determined as the sum of all discharge inputs. Seasonal background refers to the measured ambient quality of local water resources prior to impact by the project. It is normally determined immediately upstream of the project boundary or discharge point on the same day that the discharge quality is tested.
- b Mixing zones should not exceed 10 per cent of any wetland's seasonal area, nor 10 per cent of any waterway's seasonal width.
- c The alkalinity of the receiving water (milligrams per litre as CaCO<sub>3</sub>) will influence the resultant pH after mixing.
- d Applies to waters with slight to moderately disturbed ecosystems, when influenced by human land-use activities.
- e Specific radionuclides and their activity concentrations should be identified if either the gross alpha or beta limiting criteria concentrations is exceeded. If more than one radionuclide is present, the total annual dose from all radionuclides (excluding the dose from potassium 40) should not exceed 0.1 milli-Sievert.

#### Data references

Australian government - National water quality management strategy (reference 1):

Paper 4 *Australian and New Zealand guidelines for fresh and marine water quality* 2000

Paper 6 *Australian drinking water guidelines* 2004.

## References and further reading

- 1 Australian Government -National water quality management strategy papers, available online at <[www.environment.gov.au](http://www.environment.gov.au)> select *water* > *water policy and programs* > *water quality*
  - a *Paper 2 - Policies and principles*, 1994
  - b *Paper 3 - Implementation guidelines*, 1998
  - c *Paper 4 - Australian and New Zealand guidelines for fresh and marine water quality*, 2000
  - d *Paper 6 - Australian drinking water guidelines*, 2011
  - e *Paper 7 - Australian guidelines for water quality monitoring and reporting*, 2000
  - f *Paper 21 – Australian guidelines for water recycling: Managing health and environmental risks (phase 1) 2006*

To obtain printed copies of the papers, see internet site <[www.awa.asn.au](http://www.awa.asn.au)>, request by email at <[bookshop@awa.asn.au](mailto:bookshop@awa.asn.au)> or obtain them from a library.

- 2 Department of Agriculture and Food (W.A) publication available online at <www.agric.wa.gov.au>, search for <publication title>.
 

Farmnote 36/ 2004 - *Groundwater pumping for salinity control.*
- 3 Department of Environment and Conservation (WA)
  - a Wetlands policy available online at <www.dec.wa.gov.au> select *management and protection > wetlands > publications*  
Position statement *Wetlands 2001*
  - b Acid sulfate soils advice available online at <www.dec.wa.gov.au> select *management and protection > land > acid sulfate soils > publications*  
*Identification and investigation of acid sulfate soils.*
  - c Contaminated sites advice available online at <www.dec.wa.gov.au>, select *pollution prevention > contaminated sites*
    - *Assessment levels for soil, sediment and water Feb 2010*
    - *Potentially contaminating activities, industries and land uses 2004*
    - *Guidance for groundwater management in urban areas on acid sulfate soils 2004.*
- 4 Department of Water (WA) publications available online at <www.water.wa.gov.au>
  - a Environmental protection guidelines published by the Water and Rivers Commission and Department of Minerals and Energy, 2000; select *publications > find a publication > series browse > guidelines.*
    - *Guideline 5 Mining and mineral processing - mine-site stormwater*
    - *Guideline 11 Mining and mineral processing – mine dewatering.*
  - b Water quality protection notes (WQPN); select *publications > find a publication > series browse > water quality protection notes.*
    - *WQPN 30 Groundwater monitoring bores*
    - *WQPN 20 Industry - general and heavy*
    - *WQPN 22 Irrigating vegetated land with nutrient-rich wastewater*
    - *WQPN 25 Land use compatibility in public drinking water source areas*
    - *WQPN 33 Nutrient and irrigation management plans*
    - *WQPN 65 Toxic and hazardous substances- storage and use.*
  - c Waterways policy and guidelines select *publications > find a publication > series browse > policies or water notes*
    - *Foreshore policy 1 Identifying the foreshore area, WRC 2002*
    - *Water note 10 - Protecting riparian vegetation*
    - *Water note 11 - Identifying the riparian zone*
    - *Water note 23 - Determining foreshore reserves.*
  - d Stormwater manual; select *waterways health > stormwater and drainage*  
*Stormwater management manual for Western Australia.*

- 5 Engineers Australia publication available for purchase at <[www.engineersmedia.com.au](http://www.engineersmedia.com.au)> search *EA books Australian rainfall and runoff* (current edition).
- 6 Natural Resource Management Ministerial Council (Australia) available online at <[www.iah.asn.au/pdfs/mcrwba.pdf](http://www.iah.asn.au/pdfs/mcrwba.pdf)> *Minimum construction requirements for water bores in Australia* 2003.
- 7 Standards Australia publication available for purchase at <[www.saiglobal.com](http://www.saiglobal.com)> select *publications AS 5667 Water quality - sampling*
- 8 Swan River Trust (WA) publication available online at <[www.swanrivertrust.wa.gov.au](http://www.swanrivertrust.wa.gov.au)> select *planning and licensing > policies and guidelines > search for Policy SRT/DE6 Dewatering* (under review 2012)
- 9 Western Australian Planning Commission publication (prepared jointly with the Department of Environment and Conservation) available online at <[www.planning.wa.gov.au](http://www.planning.wa.gov.au)> select *publications Acid sulfate soil planning guidelines* (2008).

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## Feedback

We welcome your thoughts on this note. Feedback will help us prepare future versions. To comment on this note or seek any clarification, please contact our water source protection planning branch (details below), citing the note topic and version.

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