



Water quality protection note 55

May 2014

Looking after all our water needs

Swimming pools

Background

Due to our long, hot summers, swimming pools and spas are highly valued as part of the Western Australian lifestyle. As chemicals are used to keep pools clean and hygienic and wastes need to be released periodically, care needs to be taken to avoid harm to neighbours and the environment. With numerous pools in our suburbs, poorly managed pools could collectively cause considerable harm. With careful management, pools can operate in harmony with both community values and local environmental protection needs. The following list covers sensitive environments that could be harmed by contaminated water released from pools:

- Public drinking water source areas
- Private water supply sources (used for stock, irrigation or household supplies)
- Wetlands
- Waterways
- Remnant native vegetation
- Fish ponds
- Poorly drained structures, where water leaks or discharge may undermine or bank up against building footings or retaining walls
- Garden plants.

Pools are constructed of various materials including reinforced concrete, fibre reinforced plastic, and those with a structural surround and flexible membrane liners. All pools require measures to:

- circulate water for mixing, waste removal and disinfection
- remove solid waste such as soil, leaf litter, sun-screen, body oils and hair
- eliminate disease causing organisms such as *Naegleria* - a protozoan organism that causes the fatal brain disease amoebic meningitis
- control algae and fungal growth
- maintain their pleasing visual appeal and the comfort of users.

Purpose

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 views on minimising impacts of land use activities and facilities on water resources
- guidance on acceptable practices used to protect the quality of water resources
- a basis for the development of a multi-agency code or guidelines that consider the views of industry, government and the community, while sustaining a healthy environment.

This note advises on relevant environmental issues and makes recommendations on best practice. It is intended to inform industry operators, government officers, environmental consultants and community members on water quality protection aspects of this activity including initial planning, design, construction, operation and potential closure.

Appendices provide additional background and technical advice as follows:

- A. Data needed for assessing pool developments
- B. Relevant statutes and administering agencies
- C. Useful contacts, followed by references and further reading, note disclaimer and how to provide feedback.

Scope

This note applies to all private, commercial and community aquatic facilities including swimming pools, spas, aquatic centres and water recreation facilities in homes, mine sites, recreational camp sites, staff or student accommodation and hotels. It does not apply to swimming sites in natural water bodies, ornamental pools; or children's plastic play pools (with a capacity less than 1 kL).

Advice and recommendations

Location

- 1 Pools should be located in stable, compacted (preferably granular) soils where settlement or moisture variations are not likely to lead to structural damage to the pool.
- 2 The following types of locations should be avoided:
 - Steep slopes (see point 6)
 - Historical waste landfills
 - Mined areas
 - Peaty soils (due to acid sulfate soil risk)
 - Seismic faults and earthquake-prone zones; contact the University of Western Australia's school of earth and environment, see <www.see.uwa.edu.au>
 - Underground services such as water and gas pipes, sewers and drains to allow maintenance access
 - Areas subject to flooding (see point 11)
 - Vegetation that produces substantial leaf litter likely to foul pool water.

Near sensitive water resources

Information on the location of sensitive water resources can be obtained from the Geographic data atlas on our website www.water.wa.gov.au > tools and data > *maps and atlases*, or your nearest Department of Water regional office.

- 3 The base of swimming pools and any backwash disposal points should be located at least 2 m above the maximum seasonal groundwater table to control pool uplift and permit effective soil filtering of effluent (which may arise from overflows or splashing from within the pool).
- 4 A minimum separation distance of 30 m from pool discharges to private water supply bores is recommended for domestic pools, and 100 m for public or commercial pools to minimise the risk of contamination.
- 5 Pool effluent disposal should occur down-gradient from water supply sources (based on the gradient of the watertable).
- 6 Swimming pools should be located on gently sloping ground with a gradient of less than 1:10, unless site-specific engineering measures are taken to ensure the stability of the pool. Steep slopes may be prone to soil movement or produce excessive runoff with potential erosion problems. Runoff and boggy areas can become a medium for the transport of contaminants into water bodies.

Within public drinking water source areas (PDWSAs)

For more information about PDWSAs and their locations, visit <http://drinkingwater.water.wa.gov.au>.

- 7 Public swimming pools and aquatic centres are incompatible within priority 1 (P1) and priority 2 (P2) areas, and compatible with conditions within priority 3 (P3 areas). For more information see our Water quality protection note (WQPN) 25: *Land use compatibility in public drinking water source areas* (reference 4c).
- 8 Domestic pools associated with private dwellings are compatible land uses in P2 and P3 areas.
- 9 Pool discharges should not occur within wellhead protection zones or reservoir protection zones.

Near waterways

- 10 Adequate vegetated buffers should be maintained between any pool water discharge and waterways and estuaries to minimise the risk of harm to water quality. Information on selecting suitable buffers is available in this department's Operational policy 4.3: *Identifying and establishing waterways foreshore areas* (reference 4a) and water notes 11: *Identifying the riparian zone* and 23: *Determining foreshore reserves* (reference 4d).
- 11 Pools and their water treatment facilities should not be located on land subject to seasonal flooding, (unless the pool surface is raised above peak recorded flood levels). Contact our floodplain management section for more information.
- 12 If a proposed public pool discharge to the environment is proposed within a proclaimed waterways management area, approval should be sought from this department in accordance with the *Waterways and Conservation Act 1976*. Managed waterways include the Albany Waterways, Avon River, Leschenault Inlet, Peel-Harvey estuary,

Wilson Inlet and their surrounds. Contact your nearest Department of Water regional office.

Within the Swan River Trust area

- 13 If located where it could affect the Swan–Canning River system and the pool discharges wastewater to the local environment, public pool facilities require approval under the *Swan and Canning Rivers Management Act 2006*. For more information, contact the Swan River Trust <www.swanrivertrust.wa.gov.au>.

Wetlands

- 14 Contact the Department of Parks and Wildlife for information about wetlands and their buffer requirements <www.dpaw.wa.gov.au>. Also, refer to reference numbers 1a, 1b and 4d).

Approvals

- 15 Pools that can be filled to a depth of more than 30 cm require council registration. Contact your nearest local government office for application and approval requirements in your area.
- 16 Where a public pool used for tourism, education, accommodation, learn-to-swim or commercial or municipal purposes is to be constructed, applicants should consult the Department of Health's website at www.public.health.wa.gov.au > *topic areas* > *A–Z* > *aquatic facilities* and also read *Code of practice for the design, construction, operation management and maintenance of aquatic facilities* (Department of Health 2013, see reference 3b).
- 17 If you are planning to discharge pool water to the environment within any of the recommended separation distances from sensitive water resources listed above, please refer your proposal to your nearest Department of Water regional office. We recognise that many pools were approved and established before the introduction of current industry environmental best practice. This department may negotiate with the operators of existing pools with the aim that they progressively implement facilities and management practices that minimise risk to water resources (as practical and economic constraints allow).
- 18 If you are abstracting groundwater or surface water you may require a licence. Please contact your nearest Department of Water regional office for more information.

More detail on relevant statutes and managing agencies is provided in Appendix B.

Design and construction

The type of pool construction selected will be influenced by customer preference, intended use, cost and site conditions; however, consideration should also be given to the factors listed below.

- 19 The pool should not exert a soil pressure that may damage pipe-work.

- 20 Surface water runoff or roof drainage should be diverted away from the pool.
- 21 Provision should be made for pool effluent disposal so that it doesn't affect neighbours' properties, water supply sources or drain into surface water bodies.
- 22 The pool disinfection method selected will affect the type of construction required. For example, saltwater disinfection is best suited to fibreglass, membrane-lined or concrete pools with an impervious coating, because salts may enter tiny cracks in unsealed concrete pools and cause corrosion.

Pool surrounds

- 23 Paving should surround pools that captures splashed water, and prevents the entry of soil and leaf matter into the pool.
- 24 Buried pool pipe-work should be laid on well-compacted (more than 90 per cent maximum dry density) granular soil to avoid the risk of settlement damage, especially if loading from nearby structures may occur.
- 25 Pool operating systems (pumps, valves, filters, flow meters and chemical dosing equipment) should be located in a lockable compound that allows ease of access to pool operators, but provides safety and anti-tampering barriers to children and intruders.
- 26 Surrounding vegetation should be selected carefully and set back from the pool edge so that the minimum leaf drop occurs into the pool. Eucalypt, pine, cedar, Casuarina and deciduous trees are especially prone to dropping leaves.
- 27 Pool covers and weatherproof enclosures are recommended practice as they tend to moderate the effects of variable weather conditions and may reduce the amount of water treatment chemicals needed to maintain clean and safe pool water.
- 28 Information on pool safety fencing requirements for private pools should be obtained from your local government.

Operation and maintenance

Pool filtration

- 29 Pool filters are needed to capture leaves, silt, litter, hair and other solid matter that fouls pool water. This material ultimately clogs the filter surface reducing the pool water circulation rate and needs to be removed.
- 30 The filtered solids are flushed to waste by backwashing (reversing flow direction), except for cartridge filters which cannot be backwashed. Filter materials may consist of synthetic membrane cartridges, sand or diatomaceous earth contained in tanks. Cartridge filters require removal for cleaning, rather than backwashing. Pool filters should remove particles down to 2 – 6 microns (a micron equals one thousandth of a millimetre). Pool shapes and water cycling systems should be designed to minimise poorly flushed spots where treatment chemicals may be in excess or deficit.

Pool heating

- 31 Large pools may sometimes pipe warm water from deep aquifers through heat exchangers for pool heating. Water taken from deep confined aquifers requires a licence – contact your nearest Department of Water regional office for information on groundwater licensing.

Water quality

Pools must be well maintained to ensure they are pleasant for users and most importantly, adequately disinfected to reduce the numbers of pathogens (disease-causing microorganisms) that could potentially affect your health. These pathogens can thrive if the pool is dirty or poorly disinfected.

In warm pool water (especially above 26°C) pathogens such as the amoeba *Naegleria fowleri* may cause meningitis. Others include *Pseudomonas aeruginosa* (causes bacterial ear and skin infections) and *Cryptosporidium* and *Giardia* (parasites that cause severe diarrhoea and vomiting).

- 32 Pool water quality should be regularly tested and maintained in accordance with the Department of Health's *Code of practice for the design, construction, operation, management and maintenance of aquatic facilities* (2013, reference 3b) and *Keeping the water in your swimming pool and spa healthy – Environmental health guide* (reference 3a). Your local pool shop or mobile trained service-person can assist with water quality testing equipment and requirements. For public pools, daily testing is essential (your local government may set specific requirements).
- 33 Automatic pool cleaners should be used to remove soil and litter from the pool to the skimmer box or filter system. These should be operated regularly before pool use and kept in good working order.
- 34 Pools should be filled initially with scheme water (where accessible). Water drawn from local surface or groundwater resources can be used, provided it is tested as safe and chemically suitable for pool use (e.g. low in colour, toxins and nutrients). Untreated groundwater may cause staining or lower the effectiveness of pool treatment chemicals. Your local pool shop or the ChemCentre (see useful contacts) can advise on water quality testing and non-scheme water suitability for use in pools.

Chemical storage and use

Pool chemicals can be toxic and highly reactive. They need to be stored and used correctly to avoid harm to people or the environment.

- 35 Chemicals should be stored in a secure area with warning signs on a chemically sealed, paved floor, where they are not likely to be damaged by weather exposure, come into contact with young children or be misused by intruders. The storage area should also be well ventilated.
- 36 All chemicals should be used in accordance with the manufacturer's label instructions, and any associated safety data sheets (previously called material safety data sheets).

- 37 Personal protective equipment as recommended by chemical suppliers should be used to lower the risks of accidents.
- 38 Any chemical spills should be immediately cleaned up.
- 39 Reactive chemicals such as chlorine should not be stored with antagonistic chemicals such as acids, fuels and oils that can react explosively. They should be held in a storage enclosure fully separate from domestic areas.
- 40 All chemicals should be held in closed containers after use. Containers with decant valves should have a suitably sized drip tray.

Stormwater management

- 41 Stormwater should not be allowed to drain into the pool (except from the narrow paved splash area surrounding the pool perimeter).
- 42 For outdoor pools that are seasonally out of use, the water level should be reduced sufficiently to deal with storm events without risking pool overflow. In the south-west of the state, a 25 cm freeboard should be adequate to deal with individual storms.

Wastewater and backwash water disposal

- 43 Pool filters should be backwashed or cleaned whenever they clog with solids that noticeably slow the water filtering process. This will normally show as a pressure rise within filter pipework. Larger pools may be set up to automatically backwash filters.
- 44 Approval may be required from the relevant regulating authority where disposal of backwash water is required. Please contact your local government for more information.
- 45 The following pool wastewater and backwash disposal methods are recommended in order of preference in terms of protecting water quality:
 - a Separate solids for disposal, treat the water as required and recycle treated water back to the pool. Note: Swimming pool water needs to be treated to fit-for-purpose standard in accordance with the *Guidelines for the non-potable uses of recycled water in Western Australia* (see reference 3d). Complex and costly treatment and monitoring systems must be installed to achieve this. As such, this option is not recommended for private pools or small commercial pools.
 - b Discharge excess water into the deep sewerage scheme, only if accepted by the water service provider. Note: Water Corporation (the major water service provider in Western Australia) does not accept discharge to sewers unless all other opportunities have been fully evaluated and can be demonstrated to be unacceptable. Contact your water service provider for more information.
 - c Irrigate plants, ensuring that the water quality is suitable for the plants in question. Avoid nuisance odours from aerosols created by high pressure irrigation in residential areas. People should not be sprayed accidentally with treated water in public access areas. Discharging wastewater in stages over several days rather than in a single release may need to be considered.

d Treat wastewater to a quality compatible with maintenance of the quality of local groundwater and discharge the effluent into a dedicated soakage pit. A suitable buffer should be provided to protect bores, wetlands and waterways.

- 46 Backwash and wastewater should not be discharged to on-site sewage treatment or disposal systems such as septic tank or leach drains, as pool water chemicals may kill the micro-organisms that are essential for sewage treatment.
- 47 Running the filter waste hose under the fence to parkland or out to the road drain is also not recommended as it causes soil erosion, may pose a health risk, or effluent may drain directly into sensitive water bodies.
- 48 Pool discharge wastewater should not discharge directly to wetlands, waterways or any drains that lead into these waters, as chemicals and salts may harm natural ecosystems. Unauthorised discharges of pool water that may cause harm to people or the environment may be an offence under the *Environmental Protection Act 1986*, the *Health Act 1911*, or the *Local Government Act 1960*. Significant penalties may apply (Appendix B).
- 49 In the event that a pool needs to be fully emptied, the water should be de-chlorinated (using sodium thiosulphate or extended detention in sunlight) and any discharge to soakage matched to the infiltration rate of local soils. For saltwater pools the water should be discharged to a low permeability solar evaporation pan where practicable. Pool water discharge should not be allowed to flow overland, where it may harm surface ecosystems.
- 50 Waste brines should be discharged to a saline water body or into a solar evaporation pan (lined if needed).

Waste minimisation

- 51 Separate solids for disposal (see *Solid waste disposal* below) and recycle treated wastewater back to the pool. Note that complex and costly treatment and monitoring systems are required to ensure water meets quality requirements consistent with *Guidelines for the non-potable uses of recycled water in Western Australia* (see reference 3d). Therefore this option is not recommended for private and small-scale pools.
- 52 Covering the pool when not in use reduces water loss through evaporation, helps keep out litter and lessens the need for chemical dosing.
- 53 The pool should be kept clean when not in use, rather than try to clean a dirty pool at the start of the swimming season.

Solid waste disposal

- 54 For domestic pools, filter residue should be placed in the normal rubbish collection or composted with garden waste once any unsuitable items (such as plastic) have been removed. For public pools and aquatic centres, solid wastes should be consigned to a vermin-proof skip prior to disposal by approved landfill or approved alternative means.

55 Out-of-date, excess and waste chemicals should be sent to a facility approved by the local government to collect such waste.

Operator and employee awareness

56 People operating pool systems should be aware of and follow chemical dosing recommendations of equipment suppliers.

57 should understand the risks of unplanned water or chemical releases to the environment, and be aware of how to respond to spills.

58 At public and commercial pool facilities, operators are required to be trained as technical operators or lifeguards and should receive induction training on environmental management when receiving occupational health and public safety training. These message should be reinforced with signs.

Accidents and emergency response

59 For municipal and commercial pools there should be an incident response plan available on-site (for chemical spills, fires, vandalism, gas leaks and so on), and operators should be assigned specific response roles.

60 Equipment such as absorbent litter should be available to allow recovery of chemical spills. The spill clean-up residue should be consigned to enclosed bins for correct disposal.

61 Operators of public pools should consult the Department of Health's *Response to a faecal incident in a public swimming pool in Western Australia* (see reference 3c) to develop a response plan in the event of a faecal (human waste) or vomiting incident.

Monitoring and reporting

62 Pool operators should compile and follow a routine inspection and testing program following equipment supplier's recommendations to ensure that the pool is operating safely and efficiently, and no leakage of water or chemicals occurs. For outdoor pools make-up water will be needed to counter evaporation and splash water losses. For domestic pools, your local pool shop can assist with a water quality testing regime. For aquatic centres and commercial facilities, please refer to the Department of Health's *Code of practice for the design, construction, operation, management and maintenance of aquatic facilities* (reference 3b). Your local government may require regular reporting.

Permanent closure of pools

63 All infrastructure should be removed, surplus chemicals sent to a recycling depot and the site checked for evidence of contaminated soils. If contaminated soils are identified or suspected you should contact the Department of Environment Regulation <www.der.wa.gov.au>.

Appendix A: Data needed for assessing for pool developments

The following information will assist regulatory bodies in assessing pool developments:

- a site location and pool placement relative to boundaries and structures
- b pool water storage capacity
- c form of construction e.g. fibreglass, reinforced concrete, plastic lined
- d type of disinfection system
- e filter capacity
- f method used to dispose of filter wastes and pool backwash.

Appendix B: Statutory approvals relevant to this note include

What's regulated?	Western Australian statutes	Regulatory body
Impact on the values and ecology of land or natural waters	<i>Environmental Protection Act 1986 - Part V environmental regulation</i>	Department of Environment Regulation < www.der.wa.gov.au >
Reuse of wastewater; Community health – pools used by the public	<i>Health Act 1911;</i> Health (Aquatic Facilities) Regulations 2007	Department of Health < www.public.health.wa.gov.au >
Transport, storage and handling of fuels, solvents, explosive and dangerous goods	<i>Dangerous Goods Safety Act 2004</i> , and associated Regulations 2007	Department of Mines and Petroleum – Resources safety division < www.dmp.wa.gov.au >
Land zoning, development approval and community safety	<i>Planning and Development Act 2005</i> <i>Local Government Act 1960</i>	Department of Planning; Western Australian Planning Commission < www.planning.wa.gov.au > Local government
Discharge of waters into waterways	<i>Waterways Conservation Act 1976</i>	Department of Water regional office < www.water.wa.gov.au >
Licence to take surface water and groundwater	<i>Rights in Water and Irrigation Act 1914</i>	
Public pools and aquatic centres in existing public drinking water source areas	<i>Metropolitan Water Supply Sewerage and Drainage Act 1909;</i> <i>Country Areas Water Supply Act 1947</i>	
Waste discharges that may affect the Swan-Canning estuary or adjoining reserves	<i>Swan and Canning Rivers Management Act 2006</i>	Swan River Trust < www.swanrivertrust.wa.gov.au >
Discharge to sewer (only if allowed by service provider)	<i>Metropolitan Water Supply, Sewerage and Drainage Act 1909;</i> <i>Country Towns Sewerage Act 1948</i>	Water Corporation < www.watercorporation.com.au > or other sewerage service provider

Relevant statutes are available from the State law publisher at <www.slp.wa.gov.au>.

Appendix C: Useful contacts

- 1 ChemCentre, Phone: 08 9422 9800
<www.chemcentre.wa.gov.au>
- 2 Department of Health (Environmental Health Directorate), Phone: 08 9388 4999
<www.public.health.wa.gov.au>
- 3 Swimming Pool and Spa Association of WA, Phone: 08 9361 1344
<www.spasawa.com.au>
- 4 Western Australian Local Government Association, Phone: 08 9213 2000
<www.walga.asn.au>

References and further reading

- 1 Department of Parks and Wildlife (WA) publications, available <www.dec.wa.gov.au>:
 - a Position statement - Wetlands 2001
 - b Wetlands of the Swan Coastal Plain 1996.
- 2 Department of Health (New South Wales), 2013, *Public swimming pool and spa pool advisory document*, available
<<http://www.health.nsw.gov.au/environment/Pages/Swimming-Pool-and-Spa-Advisory-doc.aspx>>.
- 3 Department of Health (WA):
 - a *Keeping your swimming pool and spa healthy – Environmental health guide*, 2006, available
http://www.public.health.wa.gov.au/cproot/1324/2/Keeping_your_swimming_pool_and_spa_healthy.pdf
 - b *Code of practice for the design, construction, operation, management and maintenance of aquatic facilities*, August 2013, available
<http://www.public.health.wa.gov.au/cproot/1318/2/CODE%20OF%20PRACTICE-AQUATIC%20FACILITIES%202013August.pdf>.
 - c *Response to a faecal incident in a public swimming pool in Western Australia*, March 2012, available
<http://www.public.health.wa.gov.au/cproot/4461/2/Guideline%20response%20to%20faecal%20incident%20in%20a%20PH%20swimming%20Pool%20in%20WA.pdf>.
 - d *Guidelines for the non-potable uses of recycled water in Western Australia*, August 2011, available
http://www.public.health.wa.gov.au/cproot/2280/2/Guidelines%20for%20the%20Non-potable%20Uses%20of%20Recycled%20Water%20in%20WA_121019.pdf.
- 4 Department of Water (WA) publications, available <www.water.wa.gov.au> select *publications > find > series browse*:
 - a Operational policy 4.3: *Identifying and establishing waterways foreshore areas*, 2012

- b Bore licence information, select *licensing*
 - c Water quality protection notes (WQPNs):
 - WQPN 25: *Land use compatibility in public drinking water source areas*, 2004.
 - d Water notes (WNs):
 - WN4: *Wetland buffers*, 2000
 - WN11: *Identifying the riparian zone*, 2000
 - WN23: *Determining foreshore reserves*, 2001.
- 5 Environment Protection Authority (South Australia), 2004, *Disposal of swimming pool backwash water*, available <www.epa.sa.gov.au>.
- 6 Standards Australia publications available for purchase at <www.saiglobal.com>:
- a HB65-1998 Residential swimming pools - selection, maintenance and operation
 - b HB241-2002 Water management for public swimming pools and spas
 - c AS 3633 Private swimming pools – water quality
 - d AS 4276 Standard methods for water microbiology.

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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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