

Water Quality Protection Note

Risk Assessment of Public Drinking Water Source Areas

Purpose

The Department of Environment (DoE) is responsible for managing and protecting the State's water resources. As part of this role, we must ensure the sustainable management of water resources through identifying, assessing, managing, protecting, conserving, planning and assigning uses of water resources.

This water quality protection note provides advice on the approach used to assess risks that exist within catchments used to supply drinking water to cities and towns across Western Australia (known as Public Drinking Water Source Areas). The identification, assessment and management of risks is important to ensure the continued delivery of a safe, good quality drinking water to protect water quality and the health of consumers now and into the future.

Scope

This note describes the DoE's approach to the assessment of risks (to drinking water quality) in Public Drinking Water Source Areas (PDWSAs). It applies throughout Western Australia and is consistent with the approach recommended in the 2004 *Australian Drinking Water Guidelines* (ADWG). The ADWG is endorsed by Government and is also used by the Department of Health.

PDWSAs in Western Australia include any Underground Water Pollution Control Areas, Water Reserves and Catchment Areas declared under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or *Country Areas Water Supply Act 1947*. There are approximately 149 PDWSAs supplying water to consumers that will be subject to this risk assessment process.

This note provides a general guide and should not be used as the DoE's formal policy position on a specific matter, unless confirmed in writing by this Department. The note may also be varied at our discretion, as new information becomes available.

Background

When we turn on our taps, we expect safe, clean drinking water and the health of our community depends on it. To ensure that the health of all Australians is not threatened by poor drinking water quality, the National Health and Medical Research Council, with support from the Natural Resource Management Ministerial Council developed a guidance document on water quality known as the *Australian Drinking Water Guidelines*.

The ADWG contain a wealth of information on the monitoring and management of drinking water systems and information on contaminants that may be present. The current ADWG emphasises the importance of preventative management to protect drinking water quality and focuses on identifying and managing risks in a pro-active way rather than reacting to problems as they arise.

They state that the most effective means of protecting drinking water quality, and the protection of public health, is through adoption of a preventative risk based management approach that encompasses all steps in the drinking water system from the catchment right through to the consumer's tap. The drinking water system considered by the ADWG covers the catchment (i.e. PDWSA), storage (i.e. reservoirs, aquifers), water treatment plant/process and the distribution facilities used to supply the water to the consumer. For

further information on the ADWG please refer to the DoE Water Quality Note *The Australian Drinking Water Guidelines: An overview* (<<http://drinkingwater.environment.wa.gov.au>> select 'Publications') or the *Australian Drinking Water Guidelines* (<http://www.waterquality.crc.org.au/AboutDW_ADWG.htm>).

The DoE, Department of Health and Water Corporation (the largest licensed water service provider in Western Australia) have incorporated the newly developed holistic 'catchment to consumer' multiple barrier risk management framework into their policies and processes for the protection of drinking water quality and public health. Other agencies, such as The Department for Planning and Infrastructure have also played a leading role in protecting our limited drinking water supplies (see SPP 2.7 Public Drinking Water Sources).

The DoE have a key responsibility to implement catchment related aspects of the ADWG and this protection note deals with this responsibility. Issues concerning treatment and distribution of drinking water are dealt with by the Department of Health, Economic Regulation Authority, Office of Water Policy and licensed water service providers (such as the Water Corporation).

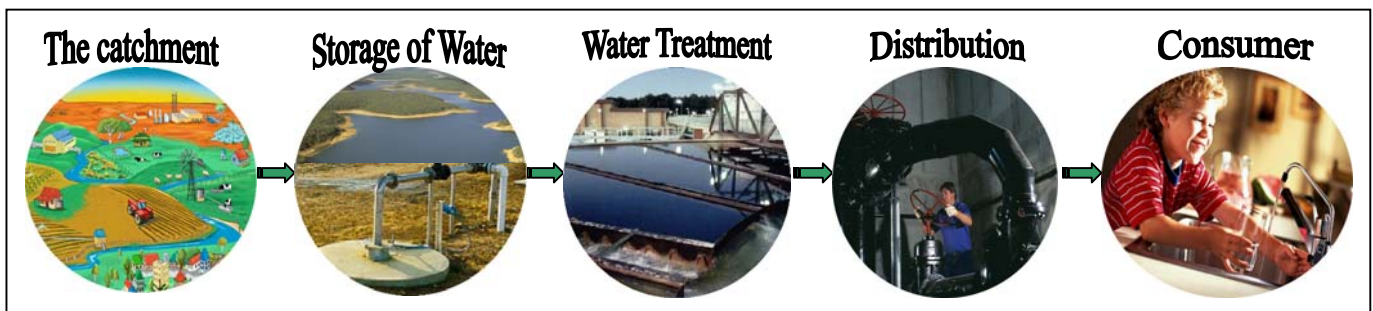


Figure 1. The 'catchment to consumer' approach.

The ADWG approach adopted for risk assessment

The risk assessment approach adopted by the ADWG requires an understanding of the entire water supply system, the hazards and events that can compromise drinking water quality and the preventative measures and operational measures that could or already are, established to assure safe and reliable drinking water. Part of that work includes a risk assessment of all PDWSAs.

According to the ADWG a structured and consistent approach is important to risk assessment and ensures issues are not overlooked and areas of considerable risk are identified. Actions required as part of hazard identification and risk assessment are:

- define the approach and methodology to be used for hazard identification and risk assessment;
- identify and document hazards, sources, hazardous events for each component;
- estimate the level of risk for each identified hazard or hazardous event;
- evaluate the major sources of uncertainty associated with each hazard and hazardous event and consider actions to reduce uncertainty;
- determine significant risks and document priorities for risk management; and
- periodically review and update the hazard identification and risk assessment to incorporate any changes.

The distinction between hazard and risk needs to be understood so that attention and resources can be directed to actions based primarily on the level of risk, rather than just the existence of a hazard. The ADWG define:

- a **hazard** as a biological, chemical, physical or radiological agent that has the potential to cause harm;
- a **hazardous event** as an incident or situation that can lead to the presence of a hazard (what can happen and how); and
- a **Risk** as the likelihood of identified hazards causing harm in exposed populations in a specified time frame, including the magnitude of that harm and the consequences.

Once the potential hazards and their sources have been identified, the level of risk associated with each can then be estimated and priorities for risk management set. It is important that expectations for the

identification of all hazards are realistic. Rarely will there is enough knowledge for a complete and detailed quantitative risk assessment and it is important to remember that it is a predictive exercise, so, it will often include subjective judgments, which inevitably contain uncertainty and limitations.

The ADWG approach suggests that risk must be assessed at two levels, Maximum risk, which is the risk posed in the absence of preventative measures, and Residual risk, which is the risk after the consideration of existing preventative measures is taken into consideration.

The evaluation of ‘maximum risk’ assists in identifying priorities for risk management, that is, high priority risks where attention should be focused and emergency responses should be put in place. ‘Residual risk’ provides an indication of the need for additional preventative measures.

In well-managed systems problems should be rare, making them more challenging to anticipate and to remedy. Problems are likely to result from unforeseen or uncommon events like short periods of sudden change, such as heavy rainfall or equipment failure. Maintaining awareness of such incidents and lessons learnt from other (national and international) drinking water suppliers will enable the implementation of measures to safeguard our waters against similar occurrences.

A Qualitative risk analysis matrix recommended by the ADWG to determine the level of risk each hazard presents is:

Consequence→	Insignificant	Minor	Moderate	Major	Catastrophic
Likelihood ↓	Risk ↓				
Almost certain	moderate	high	Very high	very high	very high
Likely	moderate	high	High	very high	very high
Possible	low	moderate	High	very high	very high
Unlikely	low	low	Moderate	high	very high
Rare	low	low	Moderate	high	high

Source: Australian Drinking Water Guidelines, 2004

The characterisation of the hazard sources and types of uncertainty can provide a better understanding of the limitations of hazard identification and risk assessment and the identification of specific areas where further information and research is required.

Implementing the risk assessment

The DoE and Water Corporation embarked on an agreed process to develop a methodology based on the ADWG risk assessment guidance. The method considers qualitative (not quantitative) measures of likelihood and consequence (or severity) of a hazard to determine the level of risk posed.

From the risk assessment analysis, hazards are assigned a **Management Priority** (*High, Medium or Low*). This step ensures appropriate resources, mitigation and control measures are focused on delivering positive outcomes as part of the risk response.

Once the risk assessment is complete and the management priority determined, action can then be taken to prevent or minimise the hazard and its likelihood to reduce the risk to an acceptable level. Effective action may be taken at various levels of government, by the water service provider, industry or the community.

The findings of the risk assessment work is incorporated into Drinking Water Source Protection Assessments and Drinking Water Source Protection Plans prepared for each PDWSA. These documents report on activities and potential risks to water quality within Public Drinking Water Source Areas and provide details on appropriate management responses to ensure that the water supply remains safe. These documents are available on the DOE Internet site at <<http://drinkingwater.environment.wa.gov.au>> (select ‘Publications’). Further explanation on these documents is also available in the DoE’s Water Quality Protection Note *Protecting Public Drinking Water Source Areas* at <<http://drinkingwater.environment.wa.gov.au>> (select ‘Publications’).

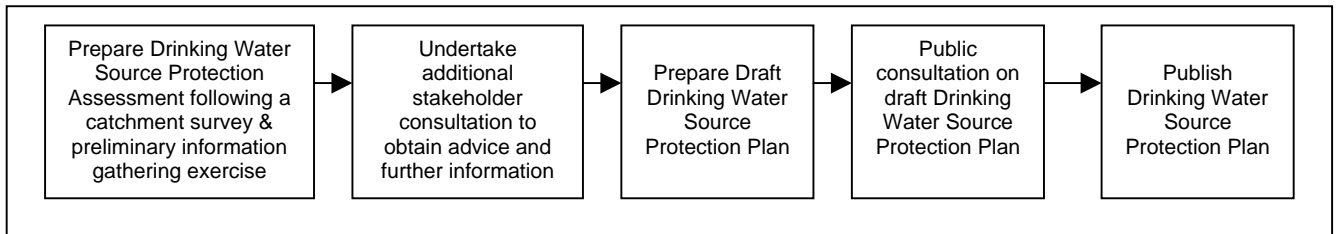


Figure 1. The process used to develop Drinking Water Source Protection Plans.

Implementation of the findings from these Assessments and Plans is coordinated by the DoE with assistance from key stakeholders. Where **high** or **very high** risks exist that cannot be dealt with directly by the DoE or Water Corporation, the risk will be identified to the relevant agency or stakeholder for appropriate action.

As our knowledge and understanding of risk increase, the risk assessment approach adopted by the DoE and water service providers will be updated and refined to reflect new information and processes.

More information or feedback

More information on drinking water protection issues is available on DoE's Internet site <<http://www.environment.wa.gov.au/protect/policy>> (select 'Water') or by contacting the DoE's Water Source Protection Branch.

We welcome your comments on this note which will be reviewed periodically depending on feedback, experience with the risk assessment process and any future recommendations in the ADWG. Specific enquires on this note should be referred to the DoE's Water Source Protection Branch, citing the topic and version.



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Appendix A- References and further reading

Department of Environment, 2004, *Water Quality Protection Note – Land use compatibility in Public Drinking Water Source Areas*, Department of Environment, Perth.

See: <<http://drinkingwater.environment.wa.gov.au>>

Department of Environment, 2004, *Water Quality Protection Note – The Australian Drinking Water Guidelines: An overview*, Department of Environment, Perth.

See: <<http://drinkingwater.environment.wa.gov.au>>

National Health and Medical Research Council & Natural Resource Management Ministerial Council, 2004, *National Water Quality Management Strategy: Australian Drinking Water Guidelines: 6*, Australian Government. See: <<http://www.nhmrc.gov.au/publications/pdf/awgl.pdf>>

National Health and Medical Research Council & Natural Resource Management Ministerial Council, 2004, *Water made clear: A consumer guide to accompany the Australian Drinking Water Guidelines 2004*, Australian Government. See: <<http://www7.health.gov.au/nhmrc/publications/pdf/eh33.pdf>>