

EPA Guidelines

Establishing environmental values and water quality objectives

—applying the National Water Quality Management Strategy in South Australia

Issued October 2007

EPA 738/07: This guideline has been developed to assist water quality managers and stakeholders, such as regional NRM Boards, to undertake community consultation and obtain broad agreement on the values and uses for defined waterways consistent with the National Water Quality Management Strategy and the Environment Protection (Water Quality) Policy 2003. It provides guidance for the establishment of environmental values and water quality objectives for both surface and ground water bodies across South Australia.

Background

South Australia's water environments are diverse, unique and among the state's most valuable assets. They support biologically diverse ecosystems and provide a range of ecological services that sustain the livelihoods and lifestyles of many South Australians.

The use of water environments for economic and recreational activities has become more intensive, as with the use of our catchments and coasts. These uses have affected the health of our environments to an extent that threatens the very features, which make them so attractive and valuable. Their interdependent social and economic values are therefore also at risk. Periods of prolonged drought and associated water pressures mean it is even more crucial that the state's waters are sustainably managed.

The National Water Quality Management Strategy (NWQMS) provides a basis for the sustainable management of water resources in South Australia. It contains nationally agreed policies, processes and guidelines that form part of the Council of Australian Governments' Water Reform Agenda. Its primary objective is 'to achieve sustainable use of the nation's water resources by protecting and enhancing their quality while maintaining economic and social development' (ANZECC/ARMCANZ 1998^[1]).

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A key component of the NWQMS is establishment of environmental values (EVs) and water quality objectives (WQOs) for particular water bodies (inland, marine, and ground waters). EVs describe the uses, as agreed by a local community, a body of water should be protected for (eg aquatic ecosystems, stock watering, drinking water supply, recreation). WQOs are the corresponding water quality targets to achieve or maintain in order to protect the EV. The setting of WQOs also takes into account the social and economic impacts of achieving a particular target.

How will setting environmental values and water quality objectives help water quality management in South Australia?

EVs and WQOs will support the planning and management of water bodies by:

- enabling better regulation of pollutant discharges to water bodies by incorporation of regionally specific criteria in the *Environment Protection (Water Quality) Policy 2003* (Water Quality EPP), replacing current default values
- providing a blueprint for future management, protecting ecosystem values whilst maintaining their economic (tourism, industry, fishing and agriculture) and recreation values
- providing information for government, industry and community planning activities such as the development of Regional Natural Resources Management (NRM) Plans
- informing where best to undertake management actions and make investment to improve water quality
- supporting targeted and cost-effective water quality monitoring programs.

What is the EPA's role?

The Environment Protection Authority (EPA) plays an important role in protecting South Australia's water resources. The protection and management of water resources is an enormous task, which cannot be undertaken by a single authority. The EPA recognises the involvement and the importance of other stakeholders' roles in water quality management and works to develop a consistent approach in South Australia. The *EPA Strategic Plan* (2007) acknowledges this aim, and highlights the need for the Authority to be the principal agency in leading the development of agreed environmental values and the subsequent application of the NWQMS across the state.

The EPA primarily administers the Water Quality EPP, which is the principle legislation for managing water quality in South Australia. Water quality managers can use the Water Quality EPP criteria or amended criteria to set water quality objectives for the aquatic water resource they are managing. The EPA will play a role in ensuring that any proposed changes to environmental values and associated water quality objectives have been consulted with the community and other stakeholders, and does not impact on environmental values set elsewhere.

The Water Quality EPP also provides a range of regulatory tools such as the development of Codes of Practice and discharge limits for particular activities. These tools can assist in the management of environmental threats/pressures that may influence water quality. It is also important to note that everyone has a general obligation to comply with the requirements of the Water Quality EPP.

What is the role of Natural Resources Management Boards?

The establishment of integrated NRM and the development of regional NRM Boards across South Australia have been major state and federal government initiatives. Each of the eight regional NRM Boards is guided by a Regional NRM Plan to prioritise issues, set goals and support actions and investment.

The South Australian *State Natural Resources Management Plan* (2006) states 'all NRM programmes and projects that address water quality should involve processes that are consistent with the framework established by the NWQMS'. The EPA will support regional NRM Boards in the development and implementation of processes consistent with the NWQMS in their region.

Typically, the terminology that is applied to NRM planning is different from that developed by the NWQMS for the protection of water bodies. However, terms are compatible and interchangeable depending on the point of reference. Table 1 provides a cross reference of terminology and associated definition.

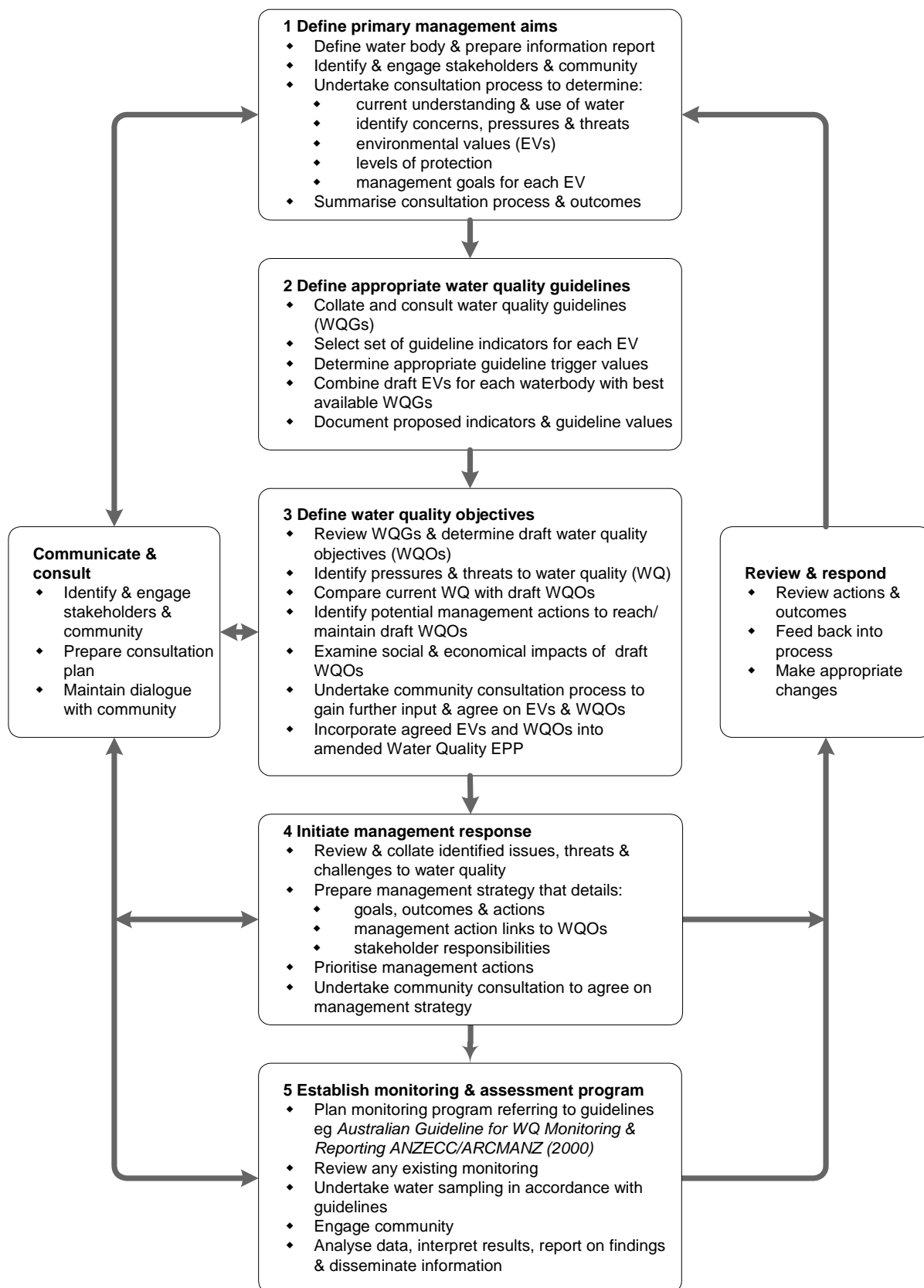
Table 1 Comparison of NWQMS and NRM terminology with associated definition

NWQMS	NRM plans	Definition
Waterway/reach	Assets/critical assets	The resource to be protected
Environmental value	Services & values	Attribute and uses of the resource
Management goals	Aspirational goals	Statements reflecting community aspirations of both asset condition and asset use/environmental values
Water quality objectives	Resource condition targets	Level of water quality required to protect environmental values/asset
Alternative management strategies/actions	Management actions & targets	Actions (and setting of short-term targets) for progressing towards an improved state of an asset as defined by the related water quality objectives/resource condition targets

How do you apply the National Water Quality Management Strategy?

The NWQMS framework has five core stages, which provide a systematic process for the development of long-term management strategies for specific water bodies (Figure 1). Supporting these core stages are the vital components of communication and consultation with the community that interacts with the water resource, and the need to review and revisit the process over time.

The NWQMS framework provides a broad overview of the process and principles to be followed. Individual regions may differ in the method and approach for applying the framework. The *NWQMS Implementation Guidelines* (1998) provide further detail on the process.



[t2]

[t3]

Figure 1 NWQMS Water Quality Management Framework

Stage 1 Define primary management aims

The first stage sets the foundation of the framework by establishing draft EVs and Management Goals.













Environmental values are the qualities of water bodies (inland, marine and ground water) that need protection from the effects of pollution, waste discharges and deposits to ensure healthy aquatic ecosystems and waterways that are safe and suitable for community use. They reflect the ecological, social and economic values and uses of inland, ground, estuarine, coastal and marine waters. Table 2 shows a list of potential EVs.

Management goals, perhaps more aptly described by the NRM term, Aspirational goals, provide goals to which the community aspires in order to protect an environmental value. Examples of management goals for aquatic ecosystem EVs include 'maintain seagrass beds', 'minimise nuisance algal blooms', 'make safe for swimming' and 'return riparian habitat to natural condition'. Similarly, the community may aspire to 'maintain water quality for indigenous cultural values including lore and trading' to protect the cultural and spiritual value of the water body.

Steps undertaken to establish draft EVs include:

- defining the extent of the catchment and water bodies to be evaluated. Both ground and surface (rivers, streams, lakes, estuarine, coastal and marine) waters should be considered. Depending on the complexity of waterways and available resources, it may be necessary to group waterways into sub-regions based on similar characteristics or uses
- collating and assessing current information on the water body characteristics, water quantity and quality
- collating and assessing information and data relevant to aquatic ecosystems. Areas of ecological value must be clearly identified and designated
- collating and assessing information and data relevant to current and future human water uses. Identify water bodies that have similar uses, similar characteristics or are likely to have similar EVs
- preparing an information report that provides a common information basis for community consultation. The report should be easy to interpret while providing a description of the region, water bodies, characteristics, condition, trend, aquatic ecosystem values, human water uses, water quality and potential EV designations
- developing an appropriate community consultation process that incorporates all stakeholders that are affected by or are likely to have an influence on the establishment of draft EVs and management goals
- undertaking a community consultation or survey process to establish draft EVs and management goals for water bodies in the region. The consultation should aim to reflect the community's views on current and future values of waters within the study area
- assessing the potential impacts and implications of adopting draft EVs, and if necessary, modification of these in consultation with the community
- preparing a report on the consultation process, which sets draft EVs and management goals for water bodies in the region. The report should also outline the method and results of the community consultation process.

Table 2 Various Environmental Values^[t4] (Source: Queensland EPA 2005)

Environmental Values	Supporting Details	
Aquatic Ecosystems		<p>Supporting pristine or modified Aquatic Ecosystems—see details of three possible 'Levels of Protection':</p> <p>High^[t5] conservation/ecological value systems (HCV): These are systems that are largely unmodified or have undergone little change. They are often found within national parks, conservation reserves or inaccessible locations. Targets for these systems aim to maintain no discernable change from this natural condition (ie no physical, chemical and biological change)</p> <p>Slightly to moderately disturbed systems (SMD): These systems have undergone some changes but are not considered so degraded as to be highly disturbed. Aquatic biological diversity may have been affected to some degree but the natural communities are still largely intact and functioning. An increased level of change in physical, chemical and biological elements of these ecosystems is to be expected</p> <ul style="list-style-type: none"> • Highly disturbed systems (HD): These are degraded systems likely to have lower levels of naturalness. These systems may still retain some ecological or conservation values that require protecting. Targets for these systems are likely to be less stringent and may be aimed at remediation and recovery or retaining a functional but highly modified ecosystem that supports other environmental values also assigned to it (eg primary industries).
Primary Industries	    	<p>Irrigating crops such as vines, lucerne, etc</p> <p>Water for farm use such as in fruit packing or milking sheds, etc</p> <p>Stock watering</p> <p>Water for aquaculture such as barramundi or marron farming</p> <p>Human consumption of wild or stocked fish or crustaceans</p>
Recreation & Aesthetics	  	<p>Primary recreation with direct contact with water such as swimming or snorkelling</p> <p>Secondary recreation with indirect contact with water such as boating, canoeing or sailing</p> <p>Visual appreciation with no contact with water such as picnicking, bushwalking, sightseeing</p>
Drinking Water		<p>Raw drinking water supplies for human consumption</p>
Industrial uses		<p>Water for industrial use such as power generation, manufacturing plants</p>
Cultural & Spiritual		<p>Cultural and spiritual values including the cultural values of traditional owners</p>

Stage 2 Define appropriate water quality guidelines

In Stage 2, the water quality guidelines that will enable the environmental values to be protected are selected.

Water quality guidelines are the recommended measurable levels (usually numeric) of an indicator required to support and protect the EVs of a particular water body. Water quality guidelines are provided for chemical (eg salinity, nutrients), physical (eg temperature, suspended solids, flow), and biological indicators (eg macro-invertebrate counts, seagrass distribution).

It is not possible to develop a universal set of specific guidelines that apply equally to the very wide range of water bodies and ecosystem types. However, default Australian and New Zealand Environment Conservation Council (ANZECC) guidelines or 'trigger values' are often used as a starting point for establishing guidelines (ANZECC/ARMCANZ 2000a). These trigger values are concentrations of a chemical or nutrient which, if exceeded have the potential to cause a problem and so trigger a management response. The *Australian and New Zealand Guidelines for Freshwater & Marine Water Quality* (ANZECC/ARMCANZ 2000b^[t6]) outline a hierarchy, which starts with local studies as the preferred basis for establishing local water quality guidelines through to the application of default national guidelines for aquatic ecosystems the least preferred approach.

The various steps that are undertaken include:

- collating all available water quality guideline material available for the study area, including local scientific studies and consulting the national water quality guidelines (ANZECC/ARMCANZ 2000b)
- selecting the set of guideline indicators (physical, chemical, biological) that is most appropriate for each waterbody and environmental value identified
- determining appropriate guideline trigger values for the selected indicators (eg this could be the level of salinity tolerable for crop irrigation)
- combining the resulting draft EVs from Stage 1 for each of the designated water bodies and aquifer units with the best available water quality guidelines for the particular EVs
- documenting the proposed indicators and guideline values to be used for the particular study area's water bodies.

Stage 3 Define water quality objectives

The third stage in the process establishes WQOs and assesses the environmental, social and economic impacts of meeting those WQOs. The final WQOs are subsequently incorporated into the Water Quality EPP and/or regional NRM plans.

Water quality objectives are numerical concentration levels or descriptive statements used by water resource managers to measure and report on performance. They are targets agreed between stakeholders or set by local authorities. While they are based on water quality guidelines, they may be modified by other factors including social, cultural and economic constraints. These then become the measures of success in meeting agreed water quality goals.

The various steps that are undertaken include:

- reviewing the water quality guidelines selected for each EV to produce a draft water quality objective for each indicator. Where multiple EVs are identified for a water body, guideline values will be prioritised such that the most stringent guideline value is selected. This then becomes the draft WQO for each indicator, ensuring the most sensitive EV is protected

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- identifying pressures or threats to water quality. Threats usually result from human activities that may affect the ability to reach or maintain the environmental values and associated water quality objective for a particular water resource. Environmental pressures must be identified to ensure the appropriate water quality objectives are selected to assess, monitor and manage the water resource
- analysing how current water quality differs from the draft WQO. Where current water quality is better than the draft WQO, the draft WQO should be modified to reflect the current water quality. This will ensure that the current water quality is maintained. Where current water quality is poorer than the draft WQO, further investigation must be undertaken. Any difference could be due to natural causes (eg catchment geology) or to threats resulting from past or present human activities. Refer to *Australian Guidelines for Water Quality Monitoring and Reporting* (ANZECC/ARMCANZ 2000c) for further information
- identifying potential management actions and implementation options if an exceedance of a draft WQO is due to human activities. Stakeholder groups will have a major role in developing and assessing management options. Water quality modelling may assist in determining the environmental impacts of different management options. Time targets for the desired water quality improvements must also be considered
- exploring whether achieving a particular WQO would have an unacceptable social or economic impact. A detailed wide-ranging analysis of the implications must be undertaken including social, environmental, economic, scientific, administrative, and policy considerations. If necessary, the draft WQO can be amended (in consultation with the community) to achieve a final WQO which balances environmental and economic and social concerns
- undertaking consultation with the community on the proposed final WQOs to gain further input and make any adjustments that are deemed necessary
- incorporation of the final WQOs into the Water Quality EPP and corresponding Resource Condition Targets and management actions into regional NRM plans. These are the basis for management actions and subsequent monitoring of progress towards meeting the targets.

Stage 4 Initiate a management response

The fourth stage is based on implementing management actions aimed at achieving and/or maintaining the WQOs.

Management responses need to be tailored to address issues that have been identified during the establishment of EVs and WQOs. These actions will vary according to the current condition of the resource and the threats and risks that have been identified.

The various steps that are undertaken include:

- review of the threats to water quality and management actions that were identified during Stage 3
- preparation of a management strategy detailing goals, outcomes and actions to deal with issues identified. Within the strategy, management actions should specify what needs to be undertaken in order to protect and/or maintain water quality and associated water quality objectives, and identify stakeholder responsibilities for achieving this. Therefore, engagement of key stakeholders and the community is critical in the development of management strategies
- prioritisation of management actions as there may be more actions identified than resources available to undertake them. Prioritisation can be achieved by using an environmental risk management approach, targetted to where water quality is exceeding

the WQOs. This will ensure that management actions, relating to higher risk water quality issues are targeted sooner than lower risk water quality issues

- releasing the draft management strategy for public comment and incorporating comments where appropriate into the final management strategy
- implementation of the final management strategy.

Stage 5 Establish a monitoring and assessment program

The fifth stage develops a water quality monitoring program to determine if the WQOs are being met through the management actions. If WQOs are not being met then it might be necessary to vary management actions or reassess the WQOs.

Water quality monitoring is the systematic and careful collection and analysis of samples and in situ measurements with the aim of providing information and knowledge about a water body. Monitoring programs are 'designed to measure and report on, or provide understanding about a particular situation or set of issues' (ANZECC/ARCMANZ 2000c^[17]).

The following should be considered:

- Australian Guidelines for Water Quality Monitoring and Reporting (ANZECC/ARCMANZ 2000d) sets out a standard structure for the design and implementation of a monitoring program. The monitoring program should be carefully considered and planned prior to beginning sampling
- existing monitoring programs should be reviewed to ensure that all the final WQOs are being measured appropriately. Additional monitoring should be instigated or modified where the final WQOs are not being monitored and/or there is a particular issue needing investigation
- water sampling should be conducted in accordance with the ANZECC/ARCMANZ (2000b)^[18] guidelines and accredited laboratories used to analyse samples
- stakeholders and the community should be engaged where necessary to determine their role in the monitoring program
- once results have been obtained and interpreted, the findings must be reported on. Monitoring reports need to effectively and accurately, inform a predetermined audience in a form that is readily understood. A combination of technical and non-technical reports (eg report cards) should be utilised.

Communication and consultation

Community consultation is an integral connective component spanning the five steps of the framework. It is important that the steps are well planned, comprehensive and inclusive. Steps for successful consultation include:

- identification and engagement of the stakeholders and community that are directly involved in or impacted by the project
- preparation of a consultation strategy/plan that details how the engagement will be undertaken
- dedicating time and resources to undertake the communications
- maintaining an ongoing dialogue with the community and stakeholders throughout the process.

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Review

For the successful maintenance and improvement of water quality in any water body, a review process needs to be established that properly assesses and responds to the monitoring and management actions that have been set in place.

Changing water use and improved understanding may mean that EVs and WQOs need to be modified over time. Water quality management of water bodies must be an ongoing and adaptive process with appropriate adjustments made over time.

Minimum considerations should include:

- reviewing the outcomes of monitoring data against the WQOs
- feeding results and recommendations back into an ongoing management process.
- where necessary, modifying and changing appropriated targets (including EVs & WQOs) and management actions.

Acknowledgements

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References

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CURRENCY OF THESE GUIDELINES

These guidelines offer advice to assist with compliance with the general environmental duty and specific environmental policies. They are subject to amendment and persons relying on the information should check with the EPA to ensure that it is current at any given time.

FURTHER INFORMATION

Legislation

Legislation may be viewed on the internet at: <www.legislation.sa.gov.au>

Copies of legislation are available for purchase from:

Service SA Government Legislation Outlet 101 Grenfell Street Adelaide SA 5000	Telephone: Facsimile: Internet:	13 23 24 (08) 8204 1909 < shop.service.sa.gov.au >
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