

1. Introduction

1.1 National context and need for local guidelines

The *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* (the ANZECC 2000 Guidelines) are a key technical component of Australia's National Water Quality Management Strategy (NWQMS). The NWQMS aims to achieve the sustainable use of Australia and New Zealand's water resources by protecting and enhancing their quality while maintaining economic and social development. The NWQMS is a strategy developed jointly by two ministerial councils: the Australian and New Zealand Environment and Conservation Council (ANZECC), and the Agriculture and Resources Management Council of Australia and New Zealand (ARMCANZ). The strategy now sits under the Environment Protection and Heritage Council (EPHC) and the Natural Resource Management Ministerial Council (NRMMC) with a secretariat in the Department of Environment, Water, Heritage and the Arts (DEHWA). In May 2009, the EPHC and NRMMC funded a three year program to update the ANZECC 2000 Guidelines.

The ANZECC 2000 Guidelines provide guideline values (numbers) or descriptive statements for different indicators to protect aquatic ecosystems and human uses of waters (e.g. primary recreation, human drinking water, agriculture, stock watering). For aquatic ecosystems, although the ANZECC 2000 Guidelines provide extensive default guideline values, they strongly emphasise the need to develop more locally relevant guidelines. The ANZECC 2000 Guidelines state: 'It is not possible to develop a universal set of specific guidelines that apply equally to the wide range of ecosystems in Australia and New Zealand. A framework is provided that allows the user to move beyond single-number, necessarily conservative values, to guidelines that can be refined according to local environmental conditions. This is the key message of the Guidelines.'

It is within this context that the Queensland Water Quality Guidelines have been initiated and will be progressively updated.

1.2 What are the Queensland Water Quality Guidelines?

1.2.1 Purpose

The Queensland Water Quality Guidelines (QWQG) are intended to address the need identified in the ANZECC 2000 Guidelines by:

- providing guideline values (numbers) that are tailored to Queensland regions and water types
- providing a process/framework for deriving and applying more locally specific guidelines for waters in Queensland.

1.2.2 Version and updating

This is **Version 3 (2009)** of the Queensland Water Quality Guidelines (QWQG). Subsequent versions will be released as significant new material becomes available. The QWQG is a web-based document, accessible through the department's website www.derm.qld.gov.au.

1.2.3 Extent of application

The QWQG applies to Queensland waters (including ground waters and waters within bed and banks). The spatial limits of the waters of Queensland are taken to be:

- **Land:** The state boundaries
- **Marine:** The three nautical-mile limit of Queensland waters.

The Queensland Water Quality Guidelines are intended to apply to the above-defined waters.

For the waters within the Great Barrier Reef (GBR), the Great Barrier Reef Marine Park Authority (GBRMPA) has published *Water Quality Guidelines for the Great Barrier Reef Marine Park*. Following negotiation with

GBRMPA, this version of the QWQG has been drafted to clarify the applicable water quality guidelines for different water types, particularly where there is potential for overlap. The decision rules governing this integration with GBR guidelines are detailed in section 2.3.4. The GBRMPA guidelines are available from the GBRMPA website: www.gbrmpa.gov.au/corp_site/key_issues/water_quality/draft_water_quality_guidelines.

1.2.4 Scope of the Queensland Water Quality Guidelines

The QWQG is a set of technical guidelines, primarily for the protection of Queensland aquatic ecosystems. The guidelines include locally and regionally relevant guideline values for fresh, estuarine and marine waters. The Department of Environment and Resource Management (DERM – formerly Environmental Protection Agency (EPA) and Department of Natural Resources and Water (NRW)) has been collecting water quality data from reference (unimpacted or minimally impacted) waterways since 1992. DERM has used this data, together with data collected throughout Queensland by other government agencies, tertiary institutions and other organisations, to derive the QWQG. Although the QWQG is primarily aimed at providing guidelines for aquatic ecosystems in Queensland, they also provide a limited range of state-specific guidelines for human use, including primary recreation and aquaculture. For example, undertaking aquaculture of a local species in far north Queensland might require some adjustment to the national guideline values, so local guidelines have been provided in this document.

More specifically, the main aspects covered in the QWQG (and the corresponding section number) are outlined below. The process for developing or selecting water quality guidelines is shown in Figure 2.1.1.

(a) Technical context for the guidelines (section 2)

This section introduces the following technical elements:

- the ANZECC 2000 framework for levels of ecosystem protection, with an explanation of how levels of protection influence the process of establishing guideline values for different waterways
- the division of Queensland into regions (and in some cases, sub-regions), for which different water quality guidelines are established
- the principal water types used in the guidelines, the approaches used to define/map these, and the source of guidelines used in this document (by each water type in each region)
- the relationship between the QWQG and the GBRMPA water quality guidelines
- the scope of indicators to be addressed by guidelines
- discussion on the relationship of the guidelines to the prevailing stream flow characteristics.

(b) Queensland regional or sub-regional guideline values for aquatic ecosystem protection (section 3)

This section of QWQG provides water quality guideline values (i.e. numbers) for aquatic ecosystems for a range of defined Queensland regions. For other regions (e.g. Cape York), there is insufficient information at this time to provide regional guidelines. Where more detailed local data is available the QWQG provides guideline values for smaller sub-regional areas, e.g. segments of Moreton Bay.

The guidelines are based largely on good quality reference data collected throughout Queensland by a range of government agencies, tertiary institutions and other organisations. Where available, guidelines based on biological effects data are included.

The QWQG will focus on indicators that vary regionally and for which good quality data is available – particularly physico-chemical, biological and habitat indicators. The QWQG will also seek to provide guideline information for indicators not covered in the ANZECC 2000 Guidelines. For some types of indicators (e.g. toxicants) for which there is very limited local data, the ANZECC 2000 Guidelines will remain the main source of information.

The QWQG will be the primary source of aquatic ecosystem guideline material for water quality management purposes in Queensland. Where Queensland guideline values are not available, users should default to the

ANZECC 2000 Guidelines or derive their own locally specific guidelines. On this matter, the QWQG provides guidance on how to derive local guidelines (refer to part (c) below).

Specific issues covered in section 3 include:

- water quality guidelines values (i.e. numbers) for various indicators and water types within each water quality region ('regional guideline values')
- as above but for more localised areas ('sub-regional water quality guideline values'). Where available, these take precedence over the regional guideline values
- supporting statements/explanatory notes and maps to facilitate understanding the guidelines
- supporting references/technical documents.

The QWQG also provides some technical information relating to management of riparian areas. In this version of the QWQG, the main technical source of riparian information is provided for the South-east Queensland (SEQ) region, based on work carried out for the Moreton Bay Waterways and Catchments Partnership. At the end of the SEQ section, there is a listing of riparian management source documents/guidelines, some of which have potential for application in other Queensland regions. As further technical information becomes available it will be included in future versions of these guidelines. For example, DERM is currently developing resource information to assist in identifying buffers/setbacks for wetland habitats in Queensland. The QWQG will provide additional information on riparian management as it becomes available.

(c) Procedures for deriving local guidelines for aquatic ecosystem protection (section 4)

Another key purpose of the QWQG is to provide guidance and procedures that will allow users, for example regional NRM bodies, to develop guidelines specific to their own waters (i.e. guidelines that are more localised than the QWQG and meet the QWQG's technical requirements for development of such guidelines). This may be necessary for a number of regions or water types where little previous data has been collected or where there are specific conditions that are not covered by the QWQG or ANZECC 2000 Guidelines.

Specific issues covered in section 4 include:

- general principles for deriving local guidelines
- indicators
- regions and water types (for the purposes of deriving and applying guidelines) and the rationale underlying these subdivisions
- criteria for selecting reference sites
- criteria to ensure reference data quantity and quality when deriving guidelines
- methods for deriving guideline numbers from reference data.

(d) Procedures for applying guidelines for aquatic ecosystem protection (section 5)

The QWQG contains guidance for the application of guideline values to water quality management in Queensland. Activities in which the guidelines could be used include assessments of waterway condition, processes for establishing environmental values and water quality objectives, and development assessments and licensing discharges (e.g. for activities under the *Environmental Protection Act 1994*). The QWQG provides links to other documents and guidelines to assist in this regard.

Specific issues covered in section 5 include:

- assessing test sites
 - quantity and quality requirements for data to compare with guidelines
 - procedures for comparison with guidelines
- using guidelines as an input to environmental values and water quality objectives processes; and
- development assessment, including licensing discharges.

(e) A compilation of reference data for Queensland aquatic ecosystems (section 6)

This section aims to provide reference condition data for a range of aquatic ecosystem indicators not included in the more formalised guideline tables. The purpose of this data is to provide a measure of 'normal' or 'typical'

condition which can be used as a benchmark to compare with data from potentially impacted systems. While this information is used in a similar way to guidelines, the data on which it is based is less extensive and so the information should be regarded as advisory only. Some of this information may be upgraded to guideline status in the future. In version 3 of the QWQG, this section is limited to information on metals in oysters and mussels and information on biochemical oxygen demand (BOD) but it will be expanded in future versions of the guidelines.

It is one of the long term aims of the QWQG to capture as much of this type of data as possible. Compiling this type of data within a single document will make it more readily accessible to users.

(f) A compilation of guidelines relevant to human uses of water (section 7)

For most human uses of waters (e.g. drinking, recreation, irrigation) guideline values are generally applicable across all of Australia and therefore national guidelines for these uses will remain the main source of guideline information. This section contains a compilation of the relevant national guidelines for these types of uses. In some limited instances, there may be state guideline values set for these types of uses and another of the purposes of this section is to compile these state-level guidelines. These state-level guidelines would normally take precedence over national guidelines.

(g) Guidelines for urban stormwater (section 8)

This section contains:

1. a compilation of information on 'typical' urban stormwater quality in existing urban areas
2. guidelines for urban stormwater quality in new subdivisions

The purpose of the information on typical urban stormwater quality is to provide a benchmark against which measurements of water quality in a specific urban catchment can be assessed. This would allow users to determine if anything unusual was occurring in such a catchment, i.e. something beyond normal urban contamination. The values in '1', however, should not be used to derive objectives for stormwater quality in new (or retrofitted) subdivisions. For this purpose, the guidelines under '2' should be referred to.

(h) National guidelines (section 9)

This section provides a listing of the main national guidelines applying to waterways in the absence of further information in these guidelines.

(i) Supporting technical information (appendices)

The appendices provide more detailed information on a range of issues, including water-type boundaries, mapping data sources, indicators and statistical protocols.

1.2.5 Relationship of ANZECC 2000 Guidelines and QWQG to Environmental Protection (Water) Policy 2009

Water quality guidelines can be developed at different spatial scales (e.g. national, state, local). The *Environmental Protection (Water) Policy 2009* outlines the process for determining which water quality guidelines (e.g. national, state, local) to use in water quality planning and decision making. In summary, where there is more than one set of applicable guidelines, the most locally accredited guideline information shall take precedence over broader guidelines. Thus, where the QWQG provides water quality guideline values for Queensland waters that are more localised than the ANZECC 2000 guidelines, the QWQG takes precedence over the (broader) ANZECC 2000 guidelines. However, for a number of indicators, notably toxicants, there is little or no local information. For these indicators the ANZECC 2000 Guidelines will remain the principal source of information.

Similarly, the QWQG provides a framework for establishing more localised guidelines than those currently provided in the QWQG. Where more locally relevant guidelines are appropriately developed and meet relevant technical requirements (e.g. those identified in this document), then they would in turn take precedence over the regional/sub-regional guidelines established in this document.

1.3 Queensland water quality management context

1.3.1 Links to environmental values and water quality objectives

The principal legislative basis for water quality management in Queensland is the *Environmental Protection (Water) Policy 2009* (EPP Water), which embodies the principles of the National Water Quality Management Strategy. The EPP Water includes a process for:

- identifying environmental values (EVs) of waterways, including both aquatic ecosystem values, and human use values. (The range of environmental values that may apply to waterways is summarised in Appendix H)
- establishing corresponding water quality objectives (WQOs) (also known as targets) to protect identified EVs. WQOs are established for different indicators of water quality such as pH, nutrients and toxicants. Achieving the identified WQOs for a waterway means the corresponding environmental values and uses of that waterway will be protected.

Technical water quality guidelines (such as the QWQG) form an important input to this EVs/WQOs process because they can be used as a starting point in setting WQOs. They also act as default WQOs in the absence of any scheduled EVs/WQOs. Because the EVs/WQOs process requires stakeholder input and the consideration of social/economic impacts, the finally adopted EVs/WQOs may differ from guideline values contained in the technical water quality guidelines. Where EVs/WQOs are included in Schedule 1 of the EPP Water, these take precedence over the values in the QWQG when making decisions under the EPP Water. Section 5.3 provides further detail on this issue.

Note that environmental values (EVs) and water quality objectives (WQOs) for a number of regions have been scheduled under the EPP (Water), with the QWQG acting as a primary technical input. Reference should be made to relevant EPP Water schedule 1 documents and accompanying plans accessible through the DERM website for a comprehensive listing of EVs and WQOs.

For each area scheduled under the EPP Water, there is a document and a supporting plan.

1.3.2 Associated planning processes and related documents

Water quality: Management of water quality in Queensland is undertaken through a range of statutory and non-statutory processes. Some of the primary processes and planning frameworks are listed below:

- identification of EVs and WQOs for Queensland waters under the EPP Water (For more information on the EV setting process refer to the DERM guideline [Establishing draft environmental values and water quality objectives](#))
- development approvals, including point source discharges under the *Environmental Protection Act 1994* (for more information on the process of assessing point source discharges under the Environmental Protection Act refer to DERM guideline '[Waste Water Discharge to Queensland Waters](#)')
- coastal management plans under the *Coastal Protection and Management Act 1995*
- local government planning under the Integrated Planning Act
- South East Queensland Regional Plan
- NAP and NHT regional natural resource management plans
- Murray Darling Basin management plans
- Reef Water Quality Protection Plan (2003, updated 2009)
- Water Quality Improvement Plans (WQIPs) developed for a range of GBR catchments under the Coastal Catchments Initiative
- other regional NRM body plans.

Water quantity: Management of water quantity is undertaken substantially through the provisions of the *Water Act 2000* and Water Resource Plans prepared under the Act. These are administered by the Department of Environment and Resource Management (previously by Natural Resources and Water).

Certain sections of the Act, for example, sections dealing with the preparation of draft water resource plans, also require consideration of water quality, including EVs established under the EPP Water.

Riparian management: The QWQG provides a range of technical guidance source documents for riparian management. However, for statutory vegetation management (e.g. clearing of riparian areas), reference should be made to other information sources, including the relevant regional vegetation management codes under the Vegetation Management Act. The Department of Environment and Resource Management (DERM) uses regional vegetation management codes to assess applications for clearing native vegetation. The vegetation management codes include riparian protection provisions in order to maintain values of watercourses including, for example, bank stability, water quality (by filtering sediments, nutrients and other pollutants), aquatic habitat, and terrestrial habitat. Further links to the vegetation management codes are provided in relevant sections of the QWQG. Background information on these codes (and access to the codes themselves) can be obtained from the [DERM website](#).

Queensland Wetlands Programme: In 2003, the Australian and Queensland governments established a five-year [Queensland Wetlands Program](#) to protect wetlands in the Great Barrier Reef catchment and throughout Queensland.

The program is responsible for a number of projects that are delivering a range of new tools, including wetlands mapping throughout Queensland. Both the QWQG and Queensland Wetlands Program require the identification and classification of different water/wetland types (e.g. riverine, lacustrine, palustrine, estuarine, coastal) for their respective purposes. The decision rules/definitions and information used in mapping the respective wetland/water types have, to the greatest extent possible, been kept consistent/common to both the QWQG and the Queensland Wetlands Program. Some variations may occur between the two, for example, where sub-categorisation of water/wetland types was required for one but not the other, or where different mapping decision rules were applied. Further details on water types are provided later in the QWQG (refer section 2.4 – Water types and, in particular, Appendix B).

For the latest available information on the Queensland Wetlands Program (including the latest version of its technical report '*A Wetland Mapping and Classification Methodology*', wetland definitions, supporting technical documents and mapping outputs), refer to the [Wetland Info website](#).

Monitoring procedures: A companion document to the QWQG is the Queensland Monitoring and Sampling Manual (DERM 2009). This manual provides detailed information on monitoring objectives, sampling approaches and analysis techniques, and should be referred to when undertaking monitoring for guideline development. It is available from the DERM website at www.derm.qld.gov.au