Considering Environmental Values of Water when Issuing Prevention Notices

Guidelines issued by the Environment Protection Authority to appropriate regulatory authorities under s 96(3A) of the *Protection of the Environment Operations Act 1997*

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Glossary

Note that the *Australian and New Zealand guidelines for fresh and marine water quality 2000*, published by the Australian and New Zealand Environment and Conservation Council (ANZECC) and the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ) are referred to in this document as 'the ANZECC 2000 Guidelines'.

Ambient waters: The ANZECC 2000 Guidelines define these as: 'All surrounding waters, generally of largely natural occurrence'. These include natural waterways, such as rivers, creeks, lagoons, wetlands and lakes (whether permanent, temporary, ephemeral or seasonal), groundwater and estuarine and marine waters. Ambient waterways also include artificial structures such as reservoirs and lakes that have community value for aquatic ecosystems or for human uses. Environmental values of water apply to these waters. See 'Environmental values of water apply to ambient waterways' under section 2.3 of this publication.

Environmental values of water: the *Protection of the Environment Operations Act 1997* (POEO Act) dictionary states that this means the environmental values of water specified in the ANZECC 2000 Guidelines, as in force from time to time. The ANZECC 2000 Guidelines define environmental values as: 'particular values or uses of the environment that are important for a healthy ecosystem or for public benefit, welfare, safety or health and that require protection from the effects of pollution, waste discharges and deposits. Several environmental values may be designated for a specific waterbody.'

Indicators: the ANZECC 2000 Guidelines define 'indicator' as a parameter that can provide a measure of the quality of water or the condition of an ecosystem.

In addition, the NSW Water Quality objectives website (www.environment.nsw. gov.au/ieo) defines 'indicator' to mean: 'any physical, chemical or biological characteristic used as a measure of environmental quality'.

NSW Water Quality Objectives: the environmental values of water recommended for each NSW catchment, as published by the NSW Government as the NSW Water Quality Objectives (and the NSW Marine Water Quality Objectives, in preparation at time of writing) on the website www.environment.nsw.gov.au/ieo, referred to in the text as 'the WQOs website'.

Trigger values: the ANZECC 2000 Guidelines state that: 'These are the concentrations (or loads) of the key performance indicators measured for the ecosystem, below which there exists a low risk that adverse biological (ecological) effects will occur. They indicate a risk of impact if exceeded and should 'trigger' some action, either further ecosystem specific investigations or implementation of management/remedial actions.'

Waters: under the POEO Act dictionary, *waters* means the whole or any part of:

(a) any river, stream, lake, lagoon, swamp, wetlands, unconfined surface water, natural or artificial watercourse, dam or tidal waters (including the sea), or

(b) any water stored in artificial works, any water in water mains, water pipes or water channels, or any underground or artesian water.

Water balance: the balance of water inputs and outputs to a particular site or activity—for example, comparing precipitation, inflow and waste generation with outflow, infiltration, evaporation and accumulation. Also called 'a water budget'.

Water pollution: under the POEO Act dictionary, 'water pollution' or 'pollution of waters' means:

(a) placing in or on, or otherwise introducing into or onto, waters (whether through an act or omission) any matter, whether solid, liquid or gaseous, so that the physical, chemical or biological condition of the waters is changed, or

(b) placing in or on, or otherwise introducing into or onto, the waters (whether through an act or omission) any refuse, litter, debris or other matter, whether solid or liquid or gaseous, so that the change in the condition of the waters or the refuse, litter, debris or other matter, either alone or together with any other refuse, litter, debris or matter present in the waters makes, or is likely to make, the waters unclean, noxious, poisonous or impure, detrimental to the health, safety, welfare or property of persons, undrinkable for farm animals, poisonous or harmful to aquatic life, animals, birds or fish in or around the waters or unsuitable for use in irrigation, or obstructs or interferes with, or is likely to obstruct or interfere with persons in the exercise or enjoyment of any right in relation to the waters, or

(c) placing in or on, or otherwise introducing into or onto, the waters (whether through an act or omission) any matter, whether solid, liquid or gaseous, that is of a prescribed nature, description or class or that does not comply with any standard prescribed in respect of that matter,

and, without affecting the generality of the foregoing, includes:

(d) placing any matter (whether solid, liquid or gaseous) in a position where:
  (i) it falls, descends, is washed, is blown or percolates, or
  (ii) it is likely to fall, descend, be washed, be blown or percolate, into any waters, onto the dry bed of any waters, or into any drain, channel or gutter used or designed to receive or pass rainwater, floodwater or any water that is not polluted, or

(e) placing any such matter on the dry bed of any waters, or in any drain, channel or gutter used or designed to receive or pass rainwater, floodwater or any water that is not polluted, if the matter would, had it been placed in any waters, have polluted or have been likely to pollute those waters.

Acronyms

ANZECC—Australian and New Zealand Environment and Conservation Council
ARAs—Appropriate Regulatory Authorities
AMCANZ—Agriculture and Resource Management Council of Australia
DEC—Department of Environment and Conservation NSW
EPA—NSW Environment Protection Authority, now part of the Department of Environment and Conservation NSW (DEC). DEC staff exercise certain functions of the EPA under environmental legislation.
POEO Act—Protection of the Environment Operations Act 1997
WQOs—Water Quality Objectives
WQOs website—water quality objectives website (www.environment.nsw.gov.au/ieo)

1 Introduction

This guidance applies to 'Appropriate Regulatory Authorities' (ARAs) when they issue prevention notices concerning water pollution under s 96 of the *Protection of the Environment Operations Act 1997* (POEO Act).

This publication guides ARAs on the requirements of s 96(3A) of the POEO Act, which are to consider the environmental values of water and the practical measures that can be taken to restore or maintain those environmental values.

Prevention notices are issued when an ARA reasonably suspects that an activity has been or is being carried out in an environmentally unsatisfactory manner. This publication should be read in conjunction with *A guide to notices* (DEC 2006a), which provides more general guidance on issuing prevention notices.

This publication sets out the following:

- What the Act requires under s 96(3A)—section 1.1
- Why the Act requires this—section 1.2
- How to consider environmental values of water—chapter 2
- How to consider the practical measures that can be taken to restore or maintain environmental values of water—chapter 3
- Principles for considering environmental values of water and the practical measures that could be taken—chapter 4
- Examples of applying s 96(3A)—chapter 5
- Further information—chapter 6.

1.1 What the Act requires under s 96(3A)

The POEO Act was amended in May 2006 to strengthen the consideration of water quality impacts when regulating activities that cause, have caused or are likely to cause water pollution.

Section 96(3A) of the POEO Act provides that:

> 'The appropriate regulatory authority, when determining the action to be specified in a [prevention] notice relating to an activity that causes, is likely to cause or has caused water pollution, must consider:
>
> (a) the environmental values of water affected by the activity, and
>
> (b) the practical measures that could be taken to restore or maintain those environmental values, and
>
> (c) if the appropriate regulatory authority is not the EPA—any guidelines issued by the EPA to the authority relating to the exercise of functions under this section.'

This publication (*Considering environmental values of water when issuing prevention notices*) is issued by the EPA to ARAs for the purposes of section 96(3A)(c) of the POEO Act.

The dictionary of the POEO Act states that *environmental values of water* means the environmental values of water specified in the *Australian and New Zealand guidelines for fresh and marine water quality 2000*, published by the Australian and New Zealand

Environment and Conservation Council (ANZECC) and the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), as in force from time to time.

In this publication, the ANZECC/ARMCANZ Guidelines are referred to as 'the ANZECC 2000 Guidelines'.

1.2. Why the Act requires this

The amendments to the POEO Act provide for unambiguous consideration of matters relating to environmental water quality in terms of the community's values and uses for waterways such as swimming, boating, drinking water supply, agriculture and aquatic ecosystems.

At the same time, the ARA must balance this with consideration of the practical measures that can be taken at a site to maintain or restore environmental values. This means considering, on a case-by-case basis, what level of environmental performance is reasonable and viable for the type of activity being regulated, while ensuring that the community's values and uses for waterways are considered.

These considerations provide for a clear link with the ANZECC 2000 Guidelines, which provide the nationally agreed water quality assessment framework and are used widely by industry and governments—see chapter 6: 'Further information' for weblinks.

Environmental values for each NSW catchment were endorsed by the NSW Government in 1999, after extensive community consultation on the Environmental Objectives for Water Quality and River Flow. The new requirements in the POEO Act help ARAs to take effective regulatory action to protect water quality and to focus works on the practical measures that most effectively prevent, control or minimise pollution and contribute to the environmental values of water. This should not hinder effective or urgent regulatory action, but rather should help ensure the action is focussed on measures that are most effective. The remainder of this publication explains how this can be done.

A statutory requirement to consider environmental values of water was not included for clean-up notices, given the rapid nature of clean-up action that is required by such notices.

2 How to consider environmental values of water

See the Glossary for the definition of 'environmental values of water' from the dictionary of the POEO Act.

2.1 The framework for environmental values in NSW

The ANZECC 2000 Guidelines:

- provide the generic set of environmental values for particular uses, as well as a framework to assess whether water quality supports these values
- provide default guideline levels (numerical criteria or 'trigger values') which can be used to assess water quality in most cases, as well as decision-trees and guideline packages to further refine guideline levels or tailor them to a local basis
- direct users for some environmental values to other guidelines (for example the National Health and Medical Research Council 2004, *Australian drinking water guidelines*).

DEC's guideline *Using the ANZECC guidelines and water quality objectives in NSW* (DEC 2006c) provides a quick introduction to understanding the key points of the ANZECC 2000 Guidelines, which are long, because they contain detailed scientific information and instructions for an extensive array of water quality issues. However, once the basic framework is understood, they become easier to use and in most situations only a few key parts of the document are necessary.

For most NSW catchments, the environmental values were endorsed by the NSW Government in 1999 following extensive community consultation in 1998–99. These values were published in a series of 31 booklets in 1999 as *NSW water quality and river flow interim environmental objectives* (NSW Government 1999). Note that the technical details in these booklets were derived from an earlier version of the ANZECC Guidelines. The endorsed environmental values in the booklets remain, but the technical details have been updated, based on the ANZECC 2000 Guidelines, and included on www.environment.nsw.gov.au/ieo (the WQOs website). For this reason, the booklets are no longer in print and the WQOs website is the current reference point for the NSW Water Quality Objectives and River Flow Objectives (DEC 2005a).

Consultation has also been undertaken on Marine Water Quality Objectives for NSW oceanic waters, now available on the WQOs website and as booklets (DEC 2005b).

All these NSW Water Quality Objectives use the environmental values of water specified by the ANZECC 2000 Guidelines and can be used to identify the environmental values of water, to consider the requirements of section 96(3A).

The environmental values of water and the icons representing them are as follows:

 Aquatic ecosystems

 Visual amenity

 Secondary contact recreation

 Primary contact recreation

 Livestock water supply

 Irrigation water supply

 Homestead water supply

 Drinking water at point of supply—disinfection only or clarification and disinfection

 Drinking water at point of supply—groundwater

 Aquatic foods (to be cooked before eating)

2.2 How to identify the environmental values of water

ARAs and persons carrying out regulated activities can use the WQOs website to identify which environmental values apply to a specific waterway or catchment for the purposes of considering environmental values of water under s 96(3A). The environmental values of water can be quickly identified from the WQOs website, using the map and the 'At a glance' page for each catchment. More detailed information can be obtained from the 'Objectives' and 'WQOs explained' pages.

ARAs in the Hawkesbury–Nepean, Shoalhaven, Clarence, Williams and Snowy rivers catchments should follow the links for their catchment from the 'statewide map' on the WQOs website, to identify the relevant environmental values of water. WQOs for these catchments were established through a slightly different process, as part of the inquiries undertaken by the Healthy Rivers Commission.

The WQOs are presented and mapped at the catchment scale, so ARAs will need to use their judgement and local knowledge when considering which environmental values of water apply at a particular site.

To avoid any doubt, the NSW WQOs use the environmental values of water specified by the ANZECC 2000 Guidelines, and these can also be used to identify the environmental values of water when considering the requirements of s 96(3A). See section 2.1 for more information.

2.3 Definition of waters and water pollution, and application of environmental values of water

Waters

The POEO Act dictionary states that *waters* means the whole or any part of:

'(a) any river, stream, lake, lagoon, swamp, wetlands, unconfined surface water, natural or artificial watercourse, dam or tidal waters (including the sea), or

(b) any water stored in artificial works, any water in water mains, water pipes or water channels, or any underground or artesian water.**'**

Pollution of waters

The prohibition on pollution of waters (s 120 of the POEO Act) applies to all waters. It is a defence if water pollution is authorised by an environment protection licence and the conditions of that licence are complied with.

'Water pollution' is defined in the POEO Act dictionary (see the Glossary). It is important to recognise that consideration of environmental values is a different concept to water pollution. The definition of 'water pollution' in the POEO Act dictionary should be used to determine if an offence under s 120 of the POEO Act has been committed.

Environmental values of water apply to ambient waterways

Environmental values of water apply to ambient waterways, also often called receiving waters. These include natural rivers, creeks, lagoons, wetlands and lakes (whether permanent, temporary, ephemeral or seasonal), groundwater and estuarine and marine waters. Ambient waterways also include artificial structures such as reservoirs and lakes that have community value for aquatic ecosystems or for human uses. Environmental values of water apply to these waters.

Environmental values of water and artificial works

There are no environmental values of water for some artificial works, including:

- enclosed or piped waters, for example, reticulated sewers
- operational works that occur within the site of an activity and **have no community value for aquatic ecosystems or human uses.**

For the waters in these works, the consideration of environmental values occurs when the water enters an ambient waterway, for example, where a stormwater pipe enters a creek or where sewage is treated by a sewage authority for discharge to a waterway.

To avoid any doubt, where an ARA issues a prevention notice relating to an activity that causes, has caused or is likely to cause pollution of waters to:

- **waters in sewers only, with no discharge to ambient waterways, or**
- **waters in artificial works that are operational works within the activity only, with no community value for aquatic ecosystems or human uses, and that do not discharge to other waters**

no environmental values of water apply, and therefore the requirements of s 96(3A) do not need further consideration.

Environmental values of water for groundwater

The ANZECC 2000 Guidelines apply to groundwater (see pages 1–2 of the ANZECC 2000 Guidelines) and are clear that environmental values of water apply to groundwater, and underground or artesian waters. However, environmental values of water have not been established for NSW groundwater in the same way as for surface waters. An exception is that for some catchments the WQOs identify the environmental value of 'drinking water—groundwater'. A process for identifying environmental values for groundwater is outlined in DEC's 'Guidelines for the assessment and management of groundwater contamination'. At the time of writing, these guidelines were still being prepared.

2.4 Not limits or conditions

Environmental values of water (including the numerical guideline levels or trigger values in the ANZECC 2000 Guidelines) are not designed to be directly applied as regulatory

discharge criteria, limits or conditions. Rather, the environmental values of water are one aspect to be considered when deciding what conditions to attach to a prevention notice.

Section 96(3A) requires that ARAs also consider the practical measures that can be taken to maintain or restore those values. These considerations must be balanced with other legal considerations (see DEC 2006a).

2.5 Environmental values, key issues, key indicators and trigger values

For each environmental value of water in ambient or receiving waters, the ANZECC 2000 Guidelines outline **key issues**, that is, pressures that may be a problem in the waterway.

For each issue, the ANZECC 2000 Guidelines provide **key indicators** that measure whether there may be a risk to the environmental value being achieved. Where further investigation is necessary, the ANZECC 2000 Guidelines also provide what they call '**guideline packages'** that explain each major issue and how to assess it using the key indicators.

For example, for the environmental value 'protecting aquatic ecosystems', the ANZECC 2000 Guidelines provide biological, physical and chemical indicators for each issue. A summary of key indicators is provided on the WQOs website (www.environment.nsw.gov.au/ieo) on the 'WQOs explained' page.

When considering environmental values of water under the POEO Act, the choice of indicators should be based on:

- the key issues in the local ambient waterway
- the key pollutants potentially generated by the type of activity being regulated
- any pollutants or potential pollutants of specific concern from the activity that is subject to the notice.

For each indicator, the ANZECC 2000 Guidelines provide **default trigger values**.

Where the default trigger value is not exceeded in the ambient waters, there is a low risk to the environmental value.

Where the default trigger value is exceeded in the ambient waters, there may be a risk of the environmental value not being achieved. This may trigger further investigation or management action.

In practice, where the default trigger value is exceeded, it will usually be most cost-effective, and most protective of environmental values, to take direct and prompt management action to address the likely causes of this.

However, the ANZECC 2000 Guidelines also provide that where a default trigger value is exceeded, this may be further investigated to develop a more locally-based trigger value for the ambient waterway. See section 4.5 of this publication regarding how ARAs can consider tailoring trigger values to local conditions in the context of s 96(3A).

Environmental values of water and their key issues can also be considered in terms of load or qualitative or descriptive measures. For example, the NSW Salinity Strategy and catchment action plans contain salinity targets that are expressed in terms of load and concentration. These targets were developed using the framework of environmental values. Further examples are also provided in the ANZECC 2000 Guidelines.

Table 1 shows common issues, indicators and trigger values. For a full set of environmental values, issues, indicators and trigger values, consult the ANZECC 2000 Guidelines.

Table 1: Examples of the framework for considering environmental values, issues, indicators, guideline levels and trigger values (adapted from www.environment.nsw.gov.au/ieo)

Issue	Indicator	Guideline level (default trigger value)	Further notes for application in NSW
Environmental value: Aquatic ecosystems			
Nuisance aquatic weeds (eutrophication)	Total phosphorus	Upland rivers: 20 µg/L Lowland rivers: 25 µg/L for rivers flowing to the coast; 50 µg/L for rivers in the Murray–Darling Basin Lakes and reservoirs: 10 µg/L Estuaries: 30 µg/L Marine waters: 25 µg/L	
	Total nitrogen	Upland rivers: 250 µg/L Lowland rivers: 350 µg/L for rivers flowing to the coast; 500 µg/L for rivers in the Murray–Darling Basin Lakes and reservoirs: 350 µg/L Estuaries: 300 µg/L Marine waters: 120 µg/L	
	Chlorophyll-a	Upland rivers: not applicable Lowland rivers: 5 µg/L Lakes and reservoirs: 5 µg/L. Estuaries: 4 µg/L Marine waters: 1 µg/L	
Poor optical properties	Turbidity	Upland rivers: 2–25 NTU Lowland rivers: 6–50 NTU Lakes and reservoirs: 1–20 NTU Estuaries and marine waters: 0.5–10 NTU	
Unnatural change in salinity	Salinity (electrical conductivity)	Upland rivers: 30–350 µS/cm Lowland rivers: 125–2200 µS/cm	
Lack of dissolved oxygen	Dissolved oxygen	Upland rivers: 90–110% Lowland rivers: 85–110% Freshwater lakes and reservoirs: 90–110% Estuaries: 80–110% Marine: 90–110% Note: Dissolved oxygen values were derived from daytime measurements. Dissolved oxygen concentrations may vary diurnally and with depth. Monitoring programs should assess this potential variability	

Issue	Indicator	Guideline level (default trigger value)	Further notes for application in NSW
Unnatural change in pH	pH	Upland rivers: 6.5–8.0 Lowland rivers: 6.5–8.5 Freshwater lakes and reservoirs: 6.5–8.0 Estuaries: 7.0–8.5 Marine waters: 8.0–8.4 Changes of more than 0.5 pH units from the natural seasonal maximum or minimum should be investigated. See www.environment.nsw.gov.au/ieo/tweed/#support1	
Unnatural change in temperature	Temperature	See ANZECC 2000 Guidelines, table 3.3.1.	
Toxicity to ecosystems	Chemical contaminants or toxicants—metals	See ANZECC 2000 Guidelines, chapter 3.4 and table 3.4.1. Freshwater examples: Copper – 1.4 µg/L Lead – 3.4 µg/L Zinc – 8 µg/L Marine examples: Copper – 1.3 µg/L Lead – 4.4 µg/L Zinc – 15 µg/L	
Toxicity to ecosystems	Chemical contaminants or toxicants—petroleum, oils and grease	(No trigger value provided in ANZECC 2000 Guidelines)	DEC recommends any visual evidence, scums or odours of petroleum, oils and grease in ambient waters should trigger further investigation (and clean-up or preventative action where source is known)
Various	Biological assessment indicators	This form of assessment directly evaluates whether management goals for ecosystem protection are being achieved, for example, maintenance of a certain level of species diversity, control of nuisance algae below a certain level, protection of key species. Many potential indicators exist and these may relate to single species, multiple species or whole communities. Recognised protocols using diatoms and algae, macrophytes, macroinvertebrates, and fish populations or communities may be used in NSW and interstate (for example, AusRivAS).	Biological indicators may respond to a number of catchment and waterway issues, or in some cases may respond directly to a pollution source.For regulatory purposes, it is important to consider the specific pollutants or potential pollutants from the activity that is the subject of a notice.

Issue	Indicator	Guideline level (default trigger value)	Further notes for application in NSW
Environmental value: Irrigation			
Soil structure degradation and loss of plant vigour through salinity	Salinity (electrical conductivity)	To assess the salinity and sodicity of water for irrigation use, a number of interactive factors must be considered including irrigation water quality, soil properties, plant salt tolerance, climate, landscape and water and soil management.	For more information, refer to chapter 4.2.4 of the ANZECC 2000 Guidelines. See supporting information
Environmental value: Livestock watering			
Livestock health	Algae and blue-green algae (cyano-bacteria)	An increasing risk to livestock health is likely when cell counts of microcystins exceed 11,500 cells/mL or concentrations of microcystins exceed 2.3 µg/L expressed as microcystin-LR toxicity equivalents.	
Environmental value: Visual amenity			
Scums and odours of oils, petroleum or grease		Any visual evidence, scums or odours of petroleum, oils and grease in ambient waters should trigger further investigation (and clean-up or preventative action where source is known)	
Environmental value: Primary recreation (swimming and other primary contact with water)			
Human health	Faecal coliforms	ANZECC 2000 Guidelines recommend median over bathing season of < 150 faecal coliforms per 100mL, with 4 out of 5 samples < 600/100mL (minimum of 5 samples taken at regular intervals not exceeding one month).	Beachwatch considers waters are unsuitable for swimming if: the median faecal coliform density exceeds 150 colony forming units per 100 millilitres (cfu/100mL) for five samples taken at regular intervals not exceeding one month, or the second highest sample contains equal to or greater than 600 cfu/100mL (faecal coliforms) for five samples taken at regular intervals not exceeding one month.
	Enterococci	ANZECC 2000 Guidelines recommend median over bathing season of < 35 enterococci per 100mL (maximum number in any one sample: 60–100 organisms/100mL).	Beachwatch considers waters are unsuitable for swimming if: the median enterococci density exceeds 35 cfu/100mL for five samples taken at regular intervals not exceeding one month, or the second highest sample contains equal to or greater than 100 cfu/100mL (enterococci) for five samples taken at regular intervals not exceeding one month.

Issue	Indicator	Guideline level (default trigger value)	Further notes for application in NSW
	Protozoans	Pathogenic free-living protozoans should be absent from bodies of fresh water. (Note, it is not necessary to analyse water for these pathogens unless temperature is greater than 24 degrees celsius).	
	Algae & blue-green algae	< 15 000 cells/mL	

NTU = Nephelometric Turbidity Units.
Notes: For the aquatic ecosystem environmental value, the ANZECC/ARMCANZ 2000 guidelines provide for three levels of protection according to three recognised ecosystem conditions:
1 high conservation/ecological value systems
2 slightly to moderately disturbed ecosystems
3 highly disturbed ecosystems.

The level of protection to be applied here is Level 2 as above, except for pristine and historically less disturbed areas of high conservation value where Level 1 protection, that is, no change beyond natural variability should be applied—refer to table 3.1.2 in ANZECC 2000 Guidelines.

For a more detailed list of indicators for aquatic ecosystems, see the following tables in the ANZECC 2000 Guidelines: table 3.2.2—biological indicators; tables 3.3.2 and 3.3.3—physico chemical indicators; table 3.4.1—toxicant indicators; and table 3.5.1—indicators of toxicants in bottom sediments.

2.6 What are the key risks generated by the activity?

As well as considering the issues relating to the receiving (ambient) waters under s 96(3A), it is also important to consider any other risks to the environmental values of water generated by the activity which are causing it to be carried out in an environmentally unsatisfactory manner.

For example, the activity may generate pollutants that are not currently an issue in the receiving waters, but that need to be considered when evaluating the practical measures that can be taken to maintain or restore those environmental values. These risks should be considered in terms of how they might affect the applicable environmental value(s) if the risks are poorly managed.

3 How to consider the practical measures that can be taken to restore or maintain environmental values of water

3.1 A range of practical measures can be taken

A range of practical measures may be considered to restore or maintain the environmental values of water. These include, but are not limited to, ways in which the person carrying out the activity could:

- reduce the amount of wastewater generated
- reduce the contamination or generation of stormwater
- reuse or recycle wastewater or stormwater
- treat wastewater or stormwater on-site
- retain wastewater or stormwater on-site
- store or use potential pollutants, especially fuels and toxic materials, in a manner that is isolated from stormwater and wastewater (for example, by roofing) and that can contain potential pollutants if there is an incident (for example, by bunding)
- apply any specific guidelines available for the industry. Guidelines are available for feedlots, piggeries, service stations and other industries—see chapter 6: 'Further information'
- apply any specific guidelines available for the type of pollutant, for example, on-site wastewater and sewage systems—see chapter 6: 'Further information'
- carry out maintenance procedures that would prevent, control or minimise incidents
- establish incident procedures to ensure that employees and contractors understand their responsibilities
- monitor to assess the effectiveness of action taken.

Comparing options, rather than prescribing one type of practical measure, can provide an opportunity for the ARA and the notice recipient to ensure that the action taken is the most effective one. ARAs may require the notice recipient to provide information on which practical measures have been considered and how they restore or maintain the environmental values of water.

However, where immediate action is required, the comparison of options should draw on readily available information and not be so detailed as to delay action. ARAs will need to exercise their judgment. Chapter 5 provides some case studies for guidance.

3.2 Case by case consideration of practical measures

Practical measures that maintain or restore environmental values in ambient waterways will vary depending on specific circumstances. Application of the same approach may not be appropriate in every case. The range of practical measures will vary according to:

- the industry or activity involved
- the specific water quality risks generated by the activity, for example, sediment generation from construction or pathogen risks from an on-site sewerage system
- the activity's site configuration, size, topography and adjacent land uses
- the local climate, particularly rainfall and evaporation characteristics
- the proximity of the activity to ambient waterways
- the sensitivity of nearby waterways and range of environmental values that need to be maintained or restored in those waterways
- which measures are most cost-effective in each case to enable the person carrying out the activity to meet their environmental obligations.

It is now widely recognised that the most cost-effective environmental management solutions can include those that move beyond the traditional 'treat and dispose' approach. For example, a person carrying out an activity may find it more cost-effective to reduce the amount of process water or wastewater generated or to recycle it, rather than to invest in upgrading a water treatment plant to treat increased water volumes.

A range of publications can be consulted to consider available practical measures. These include industry codes of practice and best management practice, as well as guidelines published by government agencies. See chapter 6: 'Further information' for some suggestions.

3.3 Practical measures and discharge

When considering practical measures, it is important to remember that pollution of waters is an offence under s 120 of the POEO Act. Discharge of wastewater or contaminated stormwater directly to ambient waters cannot be considered as a viable option. The EPA will not consider licensing a discharge to waters where practical measures can be taken to carry out the activity without polluting waters. In exercising its licensing functions under the POEO Act, the EPA also considers environmental values of water and the practical measures that can be taken to maintain or restore them.

3.4 Practical measures and stormwater

Where it is unavoidable that stormwater will leave a site in large or intense storms, and a prevention notice is required to ensure that the activity is carried on in an environmentally satisfactory manner, the ARA may consider the practical measures that can be taken to:

- prevent contamination of stormwater runoff
- minimise the volume of stormwater runoff generated by the activity
- ensure that the location, timing and design of any stormwater plume leaving the site in large storms will not impact on environmental values in the receiving waters, for example, by employing designs that dissipate the energy of the stormwater where it enters a water course or leaves the site of the activity
- retain stormwater runoff on-site up to a given frequency and intensity of 'design storm'.*

*Stormwater retention for a structure is often expressed by engineers in terms of the type of event it is designed to hold. An example only is a 30-minute duration 1-in-10 year storm. Note that **no design storm is specified in these guidelines**. This is because the appropriate design storm will depend on:

- the type of activity and its specific risks to environmental values
- the proximity to a waterway
- the site's location, size, topography and configuration
- the local rainfall characteristics
- what practical measures are available on a case-by-case basis.

The 'Managing urban stormwater series' provides further guidance on stormwater management. (see chapter 6: 'Further information').

3.5 Practical measures and monitoring

The POEO Act specifically includes monitoring as an action that can be specified in a prevention notice.

An ARA could require a notice recipient to monitor the condition of ambient waters before, during or after other action is required to be taken by the notice. An ARA could also issue a prevention notice that only requires monitoring as a means to more clearly identify whether the activity is being carried out in an environmentally unsatisfactory manner or is likely to impact on the environmental values of water.

It is important that the prevention notice specify the nature of the monitoring required:

- Is monitoring the condition of the ambient waterway required, upstream or downstream of the activity?
- Is monitoring of on-site performance of practical measures required, and if so is this for the notice recipient's ongoing management, or is it for compliance purposes, or both?
- Which indicators should be monitored?
- Are these indicators relevant to the environmental values and/or to the potential pollutants generated by the activity?

When considering environmental values of water under the POEO Act, the choice of indicators to be monitored should be based on:

1 the key issues in the local ambient waterway
2 the key pollutants potentially generated by the type of activity being regulated
3 any pollutants or potential pollutants of specific concern from the activity that is subject to the notice.

It is also important to consider whether monitoring is necessary, and if so, the extent of monitoring which should be carried out.

ARAs should judge whether resources of the notice recipient would be more effectively directed to action than monitoring. For example, this may be the case if urgent action is required or practical measures are widely known and accepted.

Further guidance on monitoring of ambient waterways is available in the ANZECC 2000 Guidelines.

4 Principles for considering environmental values of water and the practical measures that could be taken

4.1 Public Register and demonstrating consideration under section 96(3A)

Since 1999, under s 308 of the POEO Act, ARAs must maintain a public register of the clean-up and prevention notices they have issued. This provides an avenue for accountability to and transparency for the community in how ARAs regulate activities. ARAs should demonstrate how they have considered environmental values of water and practical measures that can be taken, by referring to this in the 'background' part of the notice. It is also recommended that file notes be retained which indicate how this was considered. ARAs should also ensure that the measures required by the conditions of the notice are consistent with this 'background'.

4.2 Manner of consideration should reflect the risk and specific circumstances

ARAs are required to consider the environmental values of water and the practical measures that can be taken to restore or maintain them. This consideration is only required to the extent that the environmental values of water are affected by the work or activity to which the prevention notice relates. An ARA must consider these factors to the extent reasonable in the situation and must also take into account other relevant considerations. See DEC 2006a for more information.

A complex investigation of a scientific nature is not usually necessary to fulfil the requirement of s 96(3A) in most situations regulated by ARAs (that are not the EPA).

The ANZECC 2000 Guidelines establish a principle that the intensity of assessment of water quality status or impacts on water quality should reflect the level and risk of potential impacts on ambient water quality and the achievement and protection of environmental values. The traditional emphasis of environmental assessment using the ANZECC 2000 Guidelines is often on relating required measures to outcomes expressed as the concentration of specific chemical indicators in water. In many instances this will remain appropriate, but it is not the only way to consider environmental values of water in the context of practical measures required by a prevention notice.

For many activities, the most practical measures will be those that ensure stormwater and wastewater are retained on-site. In these cases, it is acceptable to consider environmental values by requiring measures that will prevent a contaminated discharge, and therefore will maintain or restore the environmental values.

ARAs should ensure there is sufficient information to show that the measures proposed will effectively restore or maintain the applicable environmental values, for example, by retaining water on-site. Where some investigation is necessary, one approach is to require that the person carrying out the activity provide a report to the ARA that presents a water balance demonstrating that pollutants will be retained on-site under various rainfall–runoff scenarios ('water balance' is defined in the Glossary).

Some activities may be of a type or carried out in a manner which is likely to present a higher risk to the environmental values of water, and consideration under s 96(3A) may conclude that more complex measures than retaining water on-site are appropriate. These activities may involve storage or potential generation of toxic pollutants.

Under these circumstances, ARAs should consider requiring the person or company carrying out the activity to provide a report including a more comprehensive assessment using the ANZECC 2000 Guidelines and any available industry-specific guidance. Given the higher risk presented by the activity, it would be reasonable to expect the person or company carrying out the activity to provide a more comprehensive report in which practical measures most effectively restore or maintain the environmental values of water, so the activity is carried out in an environmentally satisfactory manner.

4.3 An urgent situation

Where the ARA needs to issue a notice to address a situation that requires immediate action to prevent likely pollution, but where a clean-up notice is not appropriate, the ARA can take this into account in considering the environmental values of water and the practical measures that can be taken. While the POEO Act does not allow for these considerations to be omitted under such circumstances, the ARA can judge the reasonable extent of consideration in an urgent situation. This can be documented in the 'background' section of the notice.

4.4 Simple assessment may be appropriate in some circumstances

ARAs can use a simple method in some circumstances to consider the environmental values of water and the practical measures that can be taken.

For example, in some cases the risk to environmental values of water is associated only with the risk of pollutants or contaminated water leaving the site of the activity in the event of an incident or storm. Practical measures can be taken to make it reasonably certain that in the event of an incident or a storm, pollutants and water can be retained on-site (so the ARA considers the activity is carried out in an environmentally satisfactory manner). In these cases, there may be no need to identify indicators or technical criteria for the environmental values to fulfil the requirements of s96(3A) (see example 1 in Chapter 5).

In other cases, it may be appropriate to identify one representative indicator, such as suspended sediment (see example 5 in Chapter 5).

The ARA can identify or require the notice recipient to identify:

- the environmental values of the relevant ambient waters
- how the activity can be carried out in a manner which prevents contaminated water or other pollutants leaving the site
- how the activity can be carried out in a manner which ensures it will maintain or restore the environmental values in the ambient waters, by preventing contaminated water or other pollutants from leaving the site.

For example, a simple water balance may demonstrate that if certain practical measures are taken, wastewater and any contaminated stormwater will be retained on-site and the activity is unlikely to be a source for pollutants that might affect the levels of these indicators.

This more straightforward assessment is usually appropriate where:

- the activity can be reasonably expected to present a low risk to the environmental values of ambient waters
- the practical measures to be taken as a result of a prevention notice ensure the activity will be carried on in an environmentally satisfactory manner, for example, by retaining potential pollutants on-site
- there are no data or the ARA or notice recipient has limited access to technical resources, and it is reasonable to not require a comprehensive assessment in terms of impact on levels of indicators of environmental values of water.

The simple assessment would usually not be appropriate where the activity is carried out or is likely to be carried out in a manner which can be reasonably expected to present a high risk to the environmental values of ambient waters. In this case, a greater level of assessment should be carried out to determine the potential impact on the environmental values of water and the practical measures that can be taken to restore or maintain those values. In this case, the assessment of impact on environmental values of water would normally involve using the full framework of issues, indicators and trigger values, and the likely impact of the activity against the trigger values in the ambient waters.

4.5 Tailoring trigger values to reflect local conditions

The ANZECC 2000 Guidelines recognise that the characteristics of ambient waters vary naturally from place to place. For example:

- the default trigger values for the environmental value of aquatic ecosystems reflect the different conditions in different ecosystems
- some of the default trigger values used for NSW reflect conditions in south-east Australia only.

Default trigger values are provided for:

- different types of ecosystems such as freshwater rivers, lakes, and estuarine and marine waters
- freshwater and marine ecosystem toxicants.

These default trigger values provide guidelines levels for assessment and management in most situations. However, the ANZECC 2000 Guidelines recognise that waters vary naturally at a more local scale, and provide ’guideline packages‘ and ’decision trees‘ to help tailor trigger values to local conditions.

Where a default trigger value is exceeded, this may be further investigated to develop a more locally-based trigger value for the ambient waterway. Tailoring of trigger values to reflect local conditions must be carried out using the process provided by the ANZECC 2000 Guidelines.

Where a recipient of a prevention notice proposes such an investigation, the ARA should consider this in the context of the environmental values of water and the practical measures that can be taken to maintain or restore these values. It may be that such an investigation would inform these considerations, but it must be recognised that the tailoring of trigger values concerns conditions in the ambient waterway only.

A prevention notice is issued when the ARA reasonably suspects that the activity is being carried out in an environmentally unsatisfactory manner. It is therefore likely that prompt

action is necessary and that practical measures should be taken to maintain or restore the environmental values of water. In these circumstances, an investigation of local ambient water quality should not be used to delay implementation of practical measures to maintain or restore these values. In this case, such an investigation will therefore generally be additional to implementing the practical measures that maintain or restore environmental values of water and ensuring the activity will be carried out in an environmentally satisfactory manner.

Where a notice recipient proposes an investigation to tailor trigger values to reflect local conditions, the ARA should require, as a condition on the prevention notice, that a report on the investigation demonstrates how the investigation is consistent with the methodology in the ANZECC 2000 Guidelines.

Further information on tailoring trigger values is available in sections 3.3 and 3.4 of the ANZECC 2000 Guidelines.

5 Examples of applying section 96(3A)

Note that *A guide to notices* (DEC 2006a) should be consulted when issuing prevention notices. Other requirements for issuing prevention notices, including procedural fairness requirements and examples of notice templates, are included in DEC 2006a, so have not been dealt with below.

Example 1: Service station and fuel depot—example of a simple assessment

An ARA reasonably suspects that the activity of operating the service station and fuel depot is being carried out in an environmentally unsatisfactory manner. A recent spillage incident revealed that there is no bunding or stormwater control on-site, and that staff and management are not aware of their responsibilities in preventing fuel from leaving the site and potentially causing pollution.

The service station and fuel depot are located on reasonably flat ground about half a kilometre from the nearest waterway.

The ARA decides to issue a prevention notice, requiring the following actions to be undertaken by a certain date:

- installation of bunding
- roofing of fuel retail and transfer areas
- stormwater drainage, and a pit to capture spills and contaminated runoff from storms
- the company carrying out the activity to develop and implement training of its staff regarding their environmental responsibilities.

The ARA demonstrates consideration of the environmental values of water by including the following in the 'background' section of the notice:

- that the environmental values applying to the nearest waterway have been identified as aquatic ecosystems, recreation, and agricultural use for irrigation and stock
- that the risk of fuel spillage or contaminated runoff from the activity could impact on all these environmental values, through potential toxicity to aquatic ecosystems, human recreation, and agricultural crops and livestock, as well as through aesthetic impacts
- that the lack of on-site water management measures increases the risk of impact to environmental values of water, through potential contamination of groundwater and through potential for contaminated surface runoff to leave the site
- that the recipient must implement management actions to retain any likely spillage on-site, to prevent the contamination of stormwater and to retain the first flush of stormwater on-site.

In this case, the risk to environmental values of water is associated only with the risk of fuel or contaminated water leaving the site. If practical measures to retain fuel and water on-site are taken so the activity is carried out in an environmentally satisfactory manner, there may be no need to identify indicators or technical criteria for the environmental values to fulfil the requirements of s 96(3A).

The ARA demonstrates consideration of the practical measures available to maintain or restore the above environmental values by requiring the notice recipient to:

- develop and implement practical measures to retain any likely spillage on-site and to retain the first flush of stormwater on-site (the ARA might also direct the recipient to use specified industry guidelines)
- consult its industry association about training for staff and procedures for incidents
- provide a report to the ARA, with hydrological calculations, demonstrating how a preferred option for managing stormwater runoff and for managing spillage incidents, will retain pollutants on-site
- implement this preferred option after receiving written authorisation from the ARA.

The ARA considers that in this case there is no need to require the notice recipient to obtain monitoring data related to the indicators for the environmental values of water, as no data is currently available and it is not reasonable to require this because of the following two points:

- the activity is some distance from the waterway
- implementation of straightforward on-site measures specified in the notice should result in a very low ongoing risk of impact on the environmental values of water and ensure that the activity is carried out in an environmentally satisfactory manner.

Example 2: Caravan park on-site sewage system

In this example, the ARA reasonably suspects that the activity is being carried out in an environmentally unsatisfactory manner, as it reasonably suspects that on-site sewage is leaking from septic tanks or absorption trenches. The caravan park is located on the shores of a reservoir which is popular for swimming and fishing and is an important refuge for waterbirds.

The ARA identifies the environmental values from the WQOs website as being protection of aquatic ecosystems, primary and secondary recreation and water quality suitable for aquatic foods. The ARA also considers that the main activity-specific risk is the generation of sewage effluent involving nutrients and pathogens.

(Note that the ARA may also need to consider whether and how the public needs to be notified of any health risks, but this is outside the scope of this publication.)

The ARA issues a prevention notice to the occupier of the caravan park requiring that they:

- provide a report assessing the likely impact of the activity on the environmental values in the lake
- recommend practical measures to maintain or restore those environmental values by managing the wastewater on-site.

The caravan park occupier commissions a local environmental consultant to assess whether the current water quality in the lake achieves the applicable environmental values, using historical data and some new samples collected over a timeframe specified in the notice. Some sampling sites are selected near the caravan park, as well as away from it. In accordance with the ANZECC 2000 Guidelines, the indicators used are:

- aquatic ecosystems—phosphorus, chlorophyll-a, turbidity
- primary and secondary recreation—pathogens (faecal coliforms, enterococci)
- water suitable for growing aquatic foods—pathogens (faecal coliforms, enterococci).

The assessment shows that away from the caravan park, the lake has levels of pathogens below the trigger levels in the ANZECC 2000 Guidelines for primary and secondary recreation. Near the caravan park, the levels are sometimes above these trigger levels, even

when there has not been any rain. The consultant also identifies likely plumes of nutrient rich water near the absorption trenches, suggesting the caravan park is the source of the higher pathogen levels. The assessment for aquatic ecosystem indicators is inconclusive.

The consultant suggests several options for improving sewage management on-site, including drawing on guidelines for on-site sewage management. Using a basic desktop assessment consistent with those guidelines, the consultant identifies a preferred option that will retain and treat the sewage effluent on-site, without risk of discharge to the lake. In the report, the consultant demonstrates that this option is likely to restore the environmental values for primary and secondary recreation in the lake, because it retains the wastewater on-site and therefore will not add to the lake's pathogen levels
.
Whilst the monitoring data was unclear on whether the caravan park was affecting aquatic ecosystem indicators, the consultant reasons that if the wastewater is kept and treated on-site, the caravan park will not be contributing to nutrient levels in the lake and will at least maintain the environmental value of aquatic ecosystems.

When the ARA has considered the report, it issues a further prevention notice specifying the practical measures to be implemented so the activity will be carried out in the future in an environmentally satisfactory manner.

Example 3: Trade waste discharge to sewer

In this example, a council is the sewage authority under the Local Government Act 1993 and is therefore responsible for managing trade waste discharges to sewers. The council is also the ARA in relation to activities specified by the POEO Act (generally those not licensed by the EPA and that are not being carried out by public authorities). An example of a situation where a council could use its powers under the POEO Act in relation to the discharge of trade waste to the sewer is as follows.

The council becomes aware that a small food processing plant generates a large quantity of wastewater which is being discharged to the sewer without authorisation, that is, there is no trade waste agreement with the council.

The discharge constitutes pollution of waters because it is not authorised by the sewage authority (s 55 of the Protection of the Environment Operations (General) Regulation 1998). Whilst the company carrying out the activity remains liable for the offence of polluting waters, the council as sewage authority is willing to consider authorising the discharge to the sewer, as long as the company lodges a trade waste application and provides an accompanying report.

Note that, as the sewage authority, the council will need to consider the requirements of the Local Government Act 1993 and associated Regulations, for authorisation of trade waste discharge to sewers. In addition, the council should consider whether it is more appropriate to use powers under the Local Government Act, before issuing a prevention notice under the POEO Act for matters concerning discharge to the sewer. These matters are not further considered here as they are outside the scope of this publication.

The ARA decides to issue a prevention notice requiring the company to:

- stop discharging trade waste to the sewer
- hold the wastewater in existing on-site tanks
- provide the trade waste application and a report to the council, which should include an assessment of the volumes and pollutants of the discharge and whether on-site

treatment can reduce concentration of pollutants discharged to the sewer, in order to meet council's criteria in its trade waste policy.

No environmental values apply to water in sewers, so in this example, the ARA demonstrates consideration of the environmental values of water by stating this fact in the 'background' section of the notice. In this case, s 96 (3A) of the POEO Act has no further application.

It should be noted that the sewerage authority will need to consider any environmental requirements associated with the sewage treatment plant when considering accepting a trade waste discharge. Further, the environmental values and practical measures related to any discharge from the sewage treatment plant will be considered by the EPA in any decisions under s 45 if the sewage authority holds an environment protection licence, and also if a prevention notice is issued by the EPA.

Note that if the ARA was seeking to have the company cease discharging into the sewer and address wastewater on-site by reduction, recycling, reuse or on-site treatment, the requirement to consider environmental values would then apply with reference to the ambient (receiving) waters in the vicinity of the site.

Example 4: An urgent incident

An incident on a factory site has been rendered safe by emergency services, but contaminated material remains on-site and is a danger to a nearby creek. The ARA needs to require the person carrying out the activity to clean up the material urgently.

In this case, the urgency for action means that the ARA should issue a clean-up notice under ss91, 92 or 93 of the POEO Act to the person carrying out the activity.

To facilitate rapid clean-up action, the Act does not require consideration of environmental values of water for clean-up notices.

Example 5: Requiring immediate action to prevent pollution

An ARA becomes aware that a construction site next to a waterway has exposed large areas of loose bare earth and has no water pollution prevention measures in place. A large rain storm is predicted the next day.

The ARA issues a prevention notice to the company carrying out the construction activity. The prevention notice requires the company to immediately install sediment fencing and a water capture structure at the lowest point of the site, and to divert water from outside the construction area away from the site.

The ARA considers the environmental values of water and the practical measures that can be taken to restore or maintain those environmental values, and sets out the following in the 'background' section of the notice:

- that the ARA reasonably suspects that the construction activity is being carried out in an environmentally unsatisfactory manner because of the lack of controls on erosion and stormwater, which the ARA describes in more detail
- the environmental values of water for the waterway are protection of aquatic ecosystems, primary and secondary recreation and livestock watering

- the key issue relating to these environmental values and this activity is generation of sediment that would be likely to leave the site and enter the waterway in the impending and future rainstorms
- the ARA reasonably suspects that stormwater runoff leaving the site would raise the indicator turbidity (a surrogate for suspended solids/suspended sediment) in the immediate receiving waters and therefore impact on the environmental values of water
- the practical measures for preventing generation of this sediment and preventing it entering the waterway are straightforward, widely used in the construction industry and widely understood to protect these environmental values of water
- guidelines on stormwater management for construction sites are readily available
- implementation of straightforward on-site measures specified in the notice should result in a very low ongoing risk of impact on the environmental values of water and ensure that the activity is carried out in an environmentally satisfactory manner.

Based on these considerations, the ARA issues a prevention notice nominating the immediate action required to be carried out so that the activity will be carried out in the future in an environmentally satisfactory manner

In this case, the need for immediate action means that this simple consideration of environmental values of water is reasonable.

Example 6: A rural property

The ARA reasonably suspects that a rural property is being managed in an environmentally unsatisfactory manner, because effluent from a small animal shed is directed into a creek and agricultural chemicals are stored outside on bare ground.

The ARA issues a prevention notice to the person carrying out the activity, requiring the effluent to be collected and recycled sustainably on the property without polluting waters, as well as requiring the chemicals to be stored in a roofed and bunded area with a sealed floor away from the waterway.

The ARA demonstrates consideration of the environmental values of water and the practical measures that can be taken to restore or maintain those environmental values, by setting out the following in the ‘background’ section of the notice:

- that the ARA reasonably suspects that the activity is being carried out in an environmentally unsatisfactory manner, because the management of effluent and agricultural chemicals on the property means that it is likely that these pollutants are not retained on-site and are entering ambient waters
- the environmental values of the waterway are protection of aquatic ecosystems, primary recreation, irrigation and livestock watering, and drinking water supply for homesteads
- the activity is likely to be impacting on these environmental values
- the key issues associated with these environmental values and with this activity are nutrients that may cause nuisance aquatic plant growth (for example, algae), sediment that may smother aquatic organisms in the waterway, pathogens that may affect suitability of the waterway for recreation and toxicants that may be toxic to aquatic ecosystems, humans, irrigated crops and stock
- the indicators of these issues are phosphorous and nitrogen, sediments, pathogens and toxic chemicals (the notice nominates some of the chemicals involved)
- samples collected by the ARA indicate that in the waterway adjacent to the property these indicators are higher than the trigger values in the ANZECC 2000 Guidelines, yet upstream of the activity they are within the trigger values

- practical measures can be taken by the person carrying out the activity to restore or maintain these environmental values and prevent further water pollution
- best practice guidance is available for the storage of agricultural chemicals and for the management and reuse of animal effluent.

Based on this consideration, the ARA issues a prevention notice nominating the action to be taken to ensure that the activity will be carried out in the future in an environmentally satisfactory manner.

6 Further information

For documents in preparation, keep checking the DEC website (www.environment.nsw.gov.au)

POEO Act – guidance for ARAs

DEC 2006a, *A guide to notices*, visit www.environment.nsw.gov.au/mao/guidetonotices.htm or phone 131 555 for a copy

DEC 2006b, *Powers of authorised officers*, visit www.environment.nsw.gov.au/mao/powersao.htm or phone 131 555 for a copy

Environmental values of water

ANZECC/ARMCANZ 2000, *Australian and New Zealand guidelines for fresh and marine water quality*, Australian and New Zealand Environment and Conservation Council and the Agriculture and Resource Management Council of Australia and New Zealand, visit www.deh.gov.au/water/quality/nwqms/index.html#quality

DEC 2005a, *NSW environmental objectives for water quality and river flow* [for fresh and estuarine waters], visit www.environment.nsw.gov.au/ieo

DEC 2005b, *NSW marine water quality objectives for NSW ocean waters*, booklets for North Coast, South Coast, Sydney Metropolitan and Hunter–Central Rivers regions, visit www.environment.nsw.gov.au/ieo or phone Environment Line on 131 555 for copies

DEC 2006c, *Using the ANZECC guidelines and water quality objectives in NSW*, Department of Environment and Conservation NSW

DEC 2006d, *Local planning for healthy waterways using the NSW water quality objectives*, Department of Environment and Conservation NSW

DEC in preparation, 'Guidelines for the assessment and management of groundwater contamination'

National Health and Medical Research Council (NHMRC) 2004, *Australian drinking water guidelines*, visit www.nhmrc.gov.au/publications/synopses/eh19syn.htm

NSW Government 1999, *NSW water quality and river flow interim environmental objectives* (Note that technical details in these booklets were derived from an earlier version of the ANZECC Guidelines. The endorsed environmental values remain, but the technical details have been updated, based on the ANZECC 2000 Guidelines, and included on the WQOs website (DEC 2005a). For this reason, the booklets are no longer in print and the WQOs website is the current reference for the NSW Water Quality Objectives and River Flow Objectives.)

Practical measures

DEC in preparation, ‘Managing urban stormwater series’

‘EPA cleaner production homepage’, visit www.environment.nsw.gov.au/cleaner_production/index.htm

‘EPA small businesss homepage’, visit www.environment.nsw.gov.au/small_business/index.htm

Landcom 2004, *Managing urban stormwater (MUS): soils and construction* (the Blue Book), visit www.landcom.nsw.gov.au/LANDCOM/NSW/me.get?site.sectionshow&PAGE332

NSW Department of Local Government 2001, *On-site sewage management for single households*, visit www.dlg.nsw.gov.au/dlg/dlghome/dlg_InformationIndex.asp?areaindex=SEPTIC&index=152