



Environmental Factor Guideline

Marine Environmental Quality

The objective of the factor *Marine Environmental Quality* is:

To maintain the quality of water, sediment and biota so that environmental values are protected.

Purpose

The purpose of this guideline is to communicate how the factor *Marine Environmental Quality* is considered by the Environmental Protection Authority (EPA) in the environmental impact assessment (EIA) process. In simple terms, the intent is to prevent or minimise pollution and protect the environmental values associated with the marine environment.

Specifically, the guideline:

- defines the factor *Marine Environmental Quality* and explains the associated environmental objective
- describes EIA considerations for this factor
- discusses the environmental values supported by marine environmental quality, and their significance
- describes issues commonly encountered by the EPA during EIA of this factor
- identifies activities that can impact on marine environmental quality
- provides a summary of the type of information that may be required by the EPA to undertake EIA related to this factor.

What does marine environmental quality mean?

The term 'environmental quality' refers to the level of contaminants in water, sediments or biota or to changes in the physical or chemical properties of waters and sediments relative to a natural state. It does not include noise pollution, which is dealt with separately under the marine fauna factor.

This guideline applies to the State's coastal waters and estuaries, including boat harbours and canals that are contiguous with the marine environment.

How this factor links with other environmental factors

The EPA recognises that there are inherent links between the factor *Marine Environmental Quality* and other environmental factors. For example, changes to marine environmental quality can affect benthic communities and habitats or human health. Conversely, marine environmental quality can be impacted by changes in the factor *Coastal Processes*.

Changes in marine environmental quality that potentially impact on the issues of amenity and aboriginal heritage under the factor *Social Surroundings*, or on the factors of *Human Health*, *Marine Fauna* and *Benthic Communities and Habitat*, will generally be addressed under the factor *Marine Environmental Quality*. However, the significance of any loss or damage to marine fauna or benthic communities will be considered under that factor.

The environmental objective for Marine Environmental Quality

The EPA's objective for this factor is: "To maintain the quality of water, sediment and biota so that environmental values are protected".

Environmental value is defined under the *Environmental Protection Act 1986* as "a beneficial use or an ecosystem health condition".

Beneficial uses are uses of the environment which are conducive to public benefit, safety or health or to aesthetic enjoyment. *Ecosystem health condition* is the condition of the environment itself and is measured in terms of ecological structure, function or processes. Both types of environmental values can be affected by emissions, degradation of the environment, or by loss or damage to natural habitats.

In the context of the EPA's objective for marine environmental quality it is only 'emissions' and, to a lesser extent, 'degradation of the environment' that are relevant considerations.

A set of five environmental values that require protection from the effects of pollution, waste discharges and deposits in marine environments have been agreed by all State, Territory and Commonwealth governments through the National Water Quality Management Strategy (NWQMS). The factor and objective for marine environmental quality recognises that the quality of the marine environment is important for protecting ecosystem health and supporting beneficial uses such as swimming that rely on good water quality.

Considerations for environmental impact assessment

Considerations for EIA for the factor *Marine Environmental Quality* include, but are not necessarily limited to:

- application of the mitigation hierarchy to avoid or minimise impacts on marine environmental quality, where possible
- the marine system that will potentially be affected and the significance of the environmental values that it supports
- options for avoiding or reducing the potential effects on the environmental values (e.g. location, waste minimisation and/or waste treatment)
- predictive modelling of the extent, duration and intensity of impacts under normal and most likely worst case scenarios, and in combination with any other changes in marine environmental quality caused by adjacent activities or natural events (cumulative effects)
- any additional mitigation strategies proposed to be implemented and the predicted residual impacts

- whether proposed mitigation approaches are technically and practically feasible
- potential impacts on the factor within the context of an environmental quality plan (EQP) as discussed in this guideline and environmental quality criteria developed consistent with current national and state guidance
- whether all analyses are undertaken to a standard consistent with recognised published guidance.

Environmental values associated with marine environmental quality and their significance

The clear, unpolluted waters of the Western Australian marine environment and the biota they support are highly valued by the community for active and passive recreational opportunities and because they provide economic value by supporting commercial fishing, aquaculture, and tourism industries.

To sustain these activities, the five environmental values that the EPA generally expects to be protected throughout Western Australia's coastal waters are:

- ecosystem health
- fishing and aquaculture
- recreation and aesthetics
- industrial water supply
- cultural and spiritual.

The EPA expects proponents to present marine related development proposals within the context of the environmental quality management framework (EQMF) recommended through the National Water Quality Management Strategy and as modified through the EPA's *Guidance for Protecting the Quality of Western Australia's Marine Environment*. The environmental values form the basis of the framework and, in combination with associated environmental quality objectives, represent the community's and other stakeholders' desired outcome for marine environmental quality. They can be represented spatially for a defined area in a map termed an Environmental Quality Plan (EQP). More detailed guidance on the EQMF and how it is applied in EIA can be found in the EPA's *Guidance for Protecting the Quality of Western Australia's Marine Environment*.

For the purposes of EIA, the EPA is concerned with marine environmental quality impacts that result in a lower level of environmental quality that may cause a change to an environmental value, including degradation in the level of ecological protection for a portion of the marine environment, or an environmental value not being protected over a portion of the marine environment.

Issues

The following issues are matters that are commonly encountered by the EPA due to the nature of proposals that are referred to it. Background on these issues is provided here to help proponents and the community engage with EIA. This issues section will be updated from time to time to reflect new issues as they arise in referrals and EIA.

Level of ecological protection

Western Australia's marine environment is generally of a very high quality because of its exposed high energy coastlines, low population pressures along the majority of the coastline, and because riverine discharges are few in number and either relatively small or episodic. The EPA believes that development impacts can be largely avoided or managed to maintain a high level of ecological protection over the majority of the coastline. Lower levels of protection should be well justified.

Existing environmental quality plans

Environmental quality plans (EQP) already exist for some parts of the Western Australian marine environment. Where they exist, they should be used as the basis to describe the effects on environmental quality of a development proposal in these areas. While there are no existing EQPs for many existing marine parks or marine management areas vested in the Conservation and Parks Commission, the environmental quality targets in the management plans can be used as the basis of an EQP over these areas.

Cockburn Sound

Cockburn Sound has lost approximately 80 per cent of its perennial seagrass meadows as a result of historical wastewater discharges and nutrient enrichment. While recent Cockburn Sound Management Council reports show there has been some improvement in water quality, seagrass has not yet returned to the areas where it was lost. This suggests that the ecology of the Sound continues to be under pressure, particularly in the southern section where water quality improvements have been less pronounced. The EPA expects proponents of development proposals in the Sound to present their proposals within the context of the EQP contained in the *State Environmental (Cockburn Sound) Policy 2015* and the associated Environmental Quality Criteria Reference Document.

State of knowledge

Natural or background quality of the marine environment is poorly described at local and regional scales over most of the Western Australian coastline. There is also limited understanding of the pressure/response relationships for development pressures on local marine flora and fauna. The level of understanding of natural conditions in the vicinity of a development proposal, and the susceptibility/resilience of biota to the pressures imparted by the development, will strongly influence the level of confidence in the environmental quality criteria and prediction of effects. The EPA will consider the adequacy of any baseline environmental quality data and the level of understanding of the pressure/response relationships demonstrated by the proponent when assessing proposals that can affect marine environmental quality.

The primary reference documents for determining relevant guidelines for water, sediment and biota quality are:

- the *Australian and New Zealand Guidelines for Fresh and Marine Water Quality* published under the National Water Quality Management Strategy
- the Australian New Zealand Food Standards Code
- the Western Australian Shellfish Quality Assurance Program.

Impacts

Impacts on marine environmental quality can involve water, sediment and/or biota. The different types of impact include direct toxicity by natural or synthetic chemicals, bioaccumulation/bio-concentration of contaminants to toxic levels, deficiency (e.g. reduced oxygen), physical effects (e.g. increased light attenuation), bio-stimulation effects (e.g. algal blooms), or exposure to pathogenic organisms. Most development activities will result in some level of effect on marine environmental quality, but not always to a significant level.

The recommended approach for managing these impacts is risk-based and flexible and provides a basis for managing water quality to the best practicable standard and consistent with community expectations. It can be fine-tuned to address specific issues or management of cumulative impacts over large areas.

The development activities that have the potential to impact on marine environmental quality include, but are not necessarily limited to:

- discharges such as treated domestic and industrial wastewater, brine from desalination plants, produced formation water from oil production facilities, and tail-water from onshore dredge spoil disposal areas can release natural and synthetic toxic chemicals to the environment, change the physical and/or chemical characteristics of the receiving waters, enrich receiving water and sediment with nutrients, or release disease causing pathogens
- dredging and spoil disposal can increase turbidity, suspended sediment concentrations and deposition rates, alter the physical characteristics of adjacent sediments, mobilise contaminants contained within the sediments, and reduce water clarity and light over quite large areas
- dumping of rocks and other material for the construction of infrastructure such as breakwaters, groynes and rock walls can increase turbidity and reduce water clarity and light availability
- release of hydrotest fluids which can contain biocides, oxygen scavengers, anti-scalants and other chemical additives
- marine sea cage aquaculture can increase the amount of suspended organic matter in the water and deposited on adjacent sediments, increase contaminants in the sediments, reduce water clarity and increase nutrient release
- surface water runoff from urban, industrial, agricultural and mining areas can enter the marine environment directly via drains or indirectly via groundwater and carry contaminants such as heavy metals, nutrients, oils and pesticides, and pathogens
- ports, marinas and harbours generally contain higher levels of contaminants than other areas due to the presence of anti-foulants on vessels, corrosion inhibitors, and other chemicals in an environment with artificially reduced water exchange and flushing
- unplanned releases of chemicals or hydrocarbons associated with activities such as oil and gas production, transfer and storage of bulk shipping commodities, and accidental collisions or ship groundings. Generally these have a low probability of occurring but, if they do, the consequences for marine environmental quality can be severe.

Information required for EIA

Where marine environmental quality has been identified as an environmental factor the EPA may require the proponent to provide information or studies within the following broad topics:

- characterisation of the local marine environment including natural background and baseline environmental quality
- the pre-development EQP for the area including the environmental values to be protected
- a conceptual model of the marine system and the cause effect pathways for each threat or pressure resulting from the proposal (this will be used to assess risk and select relevant indicators)
- the criteria that will be used to predict the extent, severity and duration of any impacts and how they were derived
- a description of the extent, severity and duration of effects of the development in the context of the EQP (this is likely to involve predictive modelling)
- consideration of the cumulative impacts of the proposal in combination with other existing and approved developments to determine if the EQP can be achieved

- explanation of the design options and management measures and approaches taken, or to be taken, to avoid and/or minimise impacts on marine environmental quality
- a description of the residual impacts on the quality of the marine environment and, if necessary, a well justified modified EQP
- proposed methods for determining actual impacts to marine environmental quality during construction and operation of the proposal and confirmation that the EQP has been achieved
- relevant information to show that analyses have, and will be, conducted to a standard consistent with recognised published guidance where available
- mechanisms for publicly reporting results of marine environmental quality monitoring.

More detailed guidance on the composition and format of the information required for assessment can be found in the *Technical Guidance - Protecting the Quality of Western Australia's Marine Environment*.

Environmental Protection Authority 2016, *Environmental Factor Guideline: Marine Environmental Quality*, EPA, Western Australia.

This document is available in alternative formats upon request.

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