



Instructions:  
How to prepare *Environmental Protection Act*  
1986 Part IV environmental management  
plans

Environmental Protection Authority

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*Instructions: How to prepare Environmental Protection Act 1986 Part IV environmental management plans,*

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This document is available in alternative formats upon request.

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## Introduction

### Purpose of these instructions

The purpose of this document is to instruct proponents to provide the necessary information when preparing environmental management plans (EMPs) submitted under Part IV of the *Environmental Protection Act 1986* (EP Act).

The EPA expects that proponents follow the *Template: environmental management plans* (EMP Template) so that the EMP is concise and addresses the necessary information. The EMP Template provides flexibility for proponents to prepare EMPs that: cover one or more key environmental factors for a proposal; and cover one or more operations or Ministerial statements.

This guidance does not cover the preparation of mine closure plans. Refer to the Department of Mines, Industry Regulation and Safety's (DMIRS) Statutory Guidelines for Mine Closure Plans and Mine Closure Plan Guidance - how to prepare in accordance with Part 1 of the Statutory Guidelines for Mine Closure Plans. These documents are available on the DMIRS website.

### Purpose of an EMP

The purpose of an EMP is to describe how the environmental impacts of activities related to the implementation of a proposal will be:

- adequately monitored, reported on and subject to adaptive management; and/or
- adequately managed where those impacts are not likely to be able to be managed by an outcome-based condition or limitation on the extent of a proposal.

A management plan required for an implementation condition is a legally enforceable document. Proponents must comply with the components set out in the management plan.

### Advice

Proponents may contact EPA Services, Department of Water and Environmental Regulation (DWER), if assistance to prepare an EMP is needed. DWER encourages proponents proposing to develop EMPs that cover more than one Ministerial statement to consult with EPA Services, DWER, to ensure that regulatory requirements are met.

### How to prepare an EMP

Proponents should understand what is needed in an EMP to adequately demonstrate and communicate how the potential impacts on the environment will be avoided, mitigated, monitored and managed, and how environmental outcomes can be achieved.

An EMP should be a stand-alone document. Information provided in the document should be specific and directly relevant to the purpose of the EMP and able to be read and understood on its own, using clear and concise language. The EMP should not contain an assessment of impacts, but a description of the monitoring and management actions against the potential impacts on the environment.

Cross-referencing to other documents should be avoided, as this may hinder the review of the document and impact on timelines. Where appropriate, documents suitable for cross-referencing may include publicly available documents, those approved by other decision-making authorities and other approved and relevant management plans accompanying the submission.

EMPs prepared for multiple operations or a region must include proposal-specific information for each proposal, where required by the implementation conditions of Ministerial statements. A schedule may be provided for each operation or Ministerial statement.

EMP examples are provided at the end of these instructions (Attachment 1) to guide proponents in applying the EMP Template. The examples provide the structure of an EMP and the minimum requirements to assess and/or approve the plan.

Note: the examples are simplified, abbreviated examples, intended to assist readers to understand an EMP. The numbers and values used are not scientifically derived. Numbers and values should be scientifically derived for proponent prepared EMPs and be developed for each individual project based on the nature of the proposal and the environment in which it occurs. Similarly, the actions, monitoring, timing and reporting in each of the examples are for illustrative purposes only and should be fully developed for the purpose of each proposal.

## EMPs in Environmental Impact Assessment (EIA)

EMPs may be provided at referral, during an assessment by the EPA, or required as an implementation condition under a Ministerial statement.

The EPA's preference is for outcomes-based conditions where practical. Refer to [Interim Guidance: Outcomes and outcome-based conditions](#), for information about outcomes and outcomes-based conditions.

If the EPA recommends an outcomes-based conditions, the EPA may also recommend a condition which requires that proponents monitor, review and report against these environmental outcome/s, and adopt adaptive management approaches, to ensure that the environmental outcome is achieved. The EPA may recommend an **outcomes-based management plan** for this requirement.

The EPA will consider recommending **objectives-based management plan** conditions when outcome-based conditions are not practical. While the EPA's preference is for outcome-based conditions, the EPA may also recommend objectives-based management plan conditions are appropriate in some cases, such as for new industries.

Some of the EPA's environmental factors have additional guidance on the development of EMPs. In particular, under the Sea Factor, there are two Technical Guidance which have specific recommendations: [Technical Guidance Protecting the quality of Western Australia's marine environment](#) (EPA 2016) and [Technical Guidance: Environmental impact assessment of marine dredging proposals](#) (EPA 2021). Refer to the relevant technical guidance in the EPA's [Framework for environmental considerations in EIA](#).

Proponents should address the essentials of an EMP to allow efficient and timely evaluation of their plan. Information that is essential for proponents to understand the key aspects of developing an effective, fit-for-purpose EMP include: setting outcomes or objectives; monitoring and evaluation; indicators.

### Setting outcomes and objectives

Each EMP must have a clearly defined outcome or objective. The outcome or objective will state the overall purpose of the EMP. EMP outcomes or objectives should:

- be specific to the activities that are likely to impact the relevant EPA environmental factor objective
- directly relate to the proposed mitigation of the impact/s.

Submitting an EMP during assessment is the preferred approach of the EPA, and this will require proponents to define outcomes or objectives of the EMP. If an EMP is required by a Ministerial statement, the outcome or objective will be within the implementation condition/s.

Outcomes relate to monitoring indicators of environmental impacts, that is, an outcome is a specific and measurable result. Objectives will relate to implementation of management actions to mitigate impacts, that is, an objective is an intention – aimed at or sought. This is covered in more detail in Part B.

Noting the EPA's preference for outcomes-based conditions and **outcomes-based management plan**, questions to consider when assessing whether outcome-based and objective-based EMP is more appropriate to ensure the EPA's environmental factor objectives are met include:

- Is there an environmental outcome which is measurable? If yes, then outcome based more appropriate. If no, then objective based more appropriate.
- Is it more effective to monitor the impact or outcome, or action? If impacts are more effective then outcome based is more appropriate. If actions are more useful, the objective-based is more appropriate.

It is not appropriate to set an EMP objective that is the same as the EPA's objective for a key environmental factor. These objectives are too broad and high level to develop appropriate monitoring and management actions to demonstrate compliance.

Outcomes and objectives should be:

- specific and relevant to both the activities affecting the environment and the potential impacts on the affected environmental values
- measurable to enable progress to be quantified to demonstrate that compliance is achieved
- achievable to realistically demonstrate compliance given available resources, knowledge and time,
- related to the time scale of potential impacts occurring and where monitoring would detect change prior to an unacceptable impact occurring.

Determining appropriate outcomes and objectives are the pre-cursors to planning fit-for-purpose monitoring and evaluation methodologies.

Note that for some impacts, annual compliance reporting against the limits of a proposal may provide sufficient monitoring for assurance that the EPA's factor objective will be met, and an EMP may therefore not be required.

## Outcome-based EMPs

An environmental outcome, in the context of EIA, is the state of the environment at a point in time during implementation or after a proposal has been implemented (see [Interim Guidance: Environmental outcomes and outcome-based conditions](#)).

Outcome-based EMPs are performance-based. They focus on monitoring and evaluating specific measurable outcomes and are typically driven by trigger and threshold criteria. This type of EMP may apply where the part of the environment is capable of objective measurement and reporting. Outcome-based EMPs are not prescriptive about management practices, allowing opportunities for proponents to be pragmatic and innovative about how to achieve the environmental outcomes, including those set in outcomes-based conditions of Ministerial statements.



Environmental outcomes: reflect specific and measurable environmental states; have a clear boundary, size, extent, or limit; are associated with achievement of one or more of the EPA's objectives for environmental factors (refer to the EPA's [Statement of environmental principles, factors, objectives and aims of EIA](#)).

An outcome-based condition could include: an impact that must be avoided; a level of impact that must not be exceeded; a level of protection that must be achieved. Outcomes are usually defined in terms such as 'maintain' or 'no net-loss'.

Outcome-based examples:

- Outcome Example 1: The proponent shall implement the proposal to ensure no change from the baseline cover and composition of seagrass and macroalgal communities outside the 200 metre buffer zone from the discharge pipe. This is considered an outcome as the attributes of the communities (survival, recruitment, percent cover etc.) can be measured and compared to the baseline data.
- Outcome Example 2: The construction and operation of the proposal shall not result in detectable adverse impacts in water quality of Sandy Creek. This is considered an outcome as the detectable adverse impact on water quality is measurable against standards that would be identified in the trigger and/or threshold criteria of the EMP.
- Outcome Example 3: During operations the proponent shall ensure that groundwater drawdown of the local calcrete aquifer outcrop does not exceed five metres over an area greater than 50 percent of the local calcrete aquifer extent. This is considered an outcome as the groundwater drawdown is measurable and can be identified compared to the baseline data.

Indicators are selected to determine if the outcome is being achieved. The assessment of indicators can be used to evaluate the health or condition for part of the environment. The EPA has identified two levels of indicators: criteria relating to trigger levels; and criteria relating to threshold levels.

These criteria must include proposal-specific information such as location, time period, scale and a relative benchmark such as comparison to control or reference sites or to pre-established guidelines such as the National Water Quality Guidelines.

Trigger criteria are the indicators selected for monitoring to provide a warning that if exceeded, the outcome may not be achieved.

**Trigger criteria** are intended to forewarn of the approach of the threshold criteria and prompt trigger response actions. Trigger criteria must be set at a conservative level to ensure trigger level actions are implemented well in advance of the threshold criteria to avoid non-compliance and to avoid compromising the environmental outcome. Trigger criteria may be set through scientific research, impact assessment or by statutory, regulatory and/or policy requirements.

**Threshold criteria** are indicators selected to represent the limit of acceptable impact beyond which the environmental outcome is not being met and there is likely to be a significant impact on the environment. Threshold criteria may be set through scientific research, impact assessment or by statutory, regulatory and/or policy requirements.

The **trigger level actions** and **threshold contingency actions** are important considerations after determining the trigger and threshold criteria. These actions are the specific activities and timing that proponents will implement to ensure impacts remain below the trigger or threshold criteria. Actions should be defined in a manner that is easily assessed and audited.

When composing trigger and threshold criteria, proponents should consider: the predicted impacts



in the environmental review document; and requirements of any conditions in a Ministerial statement.

For example, it would not be appropriate to apply “clearing of vegetation outside of approved clearing areas” as a trigger, because this would be non-compliant with the defined clearing area in the Ministerial statement.

## Objective-based EMPs

Objective-based EMPs (previously known as management-based EMPs) relate to management actions and management targets. An **objective** is the proposal-specific desired state for an environmental factor/s, to be achieved from the implementation of management actions. An objective must relate to the EPA’s environmental objective for a particular factor/s.

Objective based examples:

- Objective-based Example 1: Implement the proposal to ensure that interruption to beach access is avoided where practicable, and otherwise minimised during operational activities. This is considered an objective as the management actions are required to achieve this objective (pedestrian pathways, signage, fencing, notification in local newspapers, coordination with local government, safety actions).
- Objective-based Example 2: During operations the proponent shall take all reasonably practicable measures to prevent, eradicate and minimise the number of feral animals attracted to the development area. This is considered an objective as the management actions are required to achieve this objective (baiting, shooting and trapping regimes, fencing, access to water and food sources).

**Management actions** are the identified actions implemented to meet the environmental objective/s. Management actions generally relate to the ‘minimise’ and ‘rehabilitate’ steps of the mitigation hierarchy.

Management actions should include auditable timelines, clear identification of record-keeping and reporting against actions and be prioritised using a risk-based approach. The greatest management effort should align with proposal activities that have the highest likelihood of causing environmental impacts, where the consequences of the impacts are severe and likely irreversible.

**Management targets** are a type of indicator that is defined to demonstrate the objective is being met. They are proposal-specific and used to assess whether the management actions are effective in addressing the identified threat or desired objective. Management targets may be quantitative (e.g. no deaths of particular fauna on haul roads, or impacts of dust on flora are confined to 20 metres from the edge of the mine pit).

Note that management target has a different definition in the EPA Technical Guidance “Environmental impact assessment of marine dredging proposals” (EPA 2021). The definition in the dredging Technical Guidance is applicable only in relation to dredging programs.

A risk-based approach is recommended to identify and prioritise management targets.

Monitoring of progress towards management targets will involve record keeping of actions undertaken and timeframes. For example, if the objective of management is to ensure that no indirect impacts occur within 50 metres of a development envelope, a target could be related to weed cover. An action related to this target could be to undertake appropriately timed weed inspections and undertake control actions to identified infestations.

## Hybrid examples - both outcome and objective-based

Hybrid Example 1: The proponent shall implement measures to: ensure noise sensitive premises within 200 metres of the development envelope achieve the day and night-time noise levels for x; and minimise noise emissions from the proposal. Considered an outcome as noise emissions are measurable and need to comply to a standard. Also considered an objective as management actions are required to achieve the objective (cladding, noise attenuation, machinery exclusion zones, separation distances, substitution of equipment).

Hybrid Example 2: The proponent shall rehabilitate the section of Long Road from Short Drive to Medium Drive within 12 months of decommissioning this section of road to achieve the following: provide vegetative cover and fauna habitat and ensure no more than 20 percent bare ground; and minimise ongoing fragmentation of ecological linkages between areas of native vegetation adjacent to Long Road. Considered an outcome as rehabilitation requires the achievement of the 20 percent completion criteria and threshold and trigger criteria can be defined and measured. Also considered an objective as the rehabilitation and the establishment of the ecological linkage involves implementing management actions such as appropriate plant selection, topsoil return, weed control, planting and seeding.

## Monitoring and evaluation

Monitoring is an essential aspect of an EMP. General information on monitoring and evaluation is provided below to assist proponents in developing scientifically robust monitoring programs, including recommendations for selecting appropriate indicators.

For monitoring to be effective it should be:

- i. **Considered early** – monitoring and associated management actions to mitigate potential impacts should be considered at the design stage of a project, including specific timing required to monitor some environmental factors (e.g. flora and vegetation). Well planned monitoring is more likely to be cost effective and efficient.
- ii. **Evidence-based** – evidence-based knowledge should inform the measures used for evaluation and management actions. Where possible, existing published standards for monitoring and evaluation against environmental factors should be applied (e.g. monitoring methodologies for some species listed under the Environment Protection and Biodiversity Conservation Act 1999 and specific methodologies and criteria for water quality in the EPA Technical Guidance for Marine Environmental Quality and the National Water Quality Guidelines).
- iii. **Risk-based** – monitoring and management actions as well as chosen indicators should align with the significance of both the potential impact/s and the environmental factor/s.
- iv. **Targeted and specific** – indicators selected and proposed management actions should be relevant to the potential impacts, the environmental objective/s and the environmental factor being monitored. Indicators being measured or evaluated should reflect the purpose of the monitoring, not what may be easiest to measure.
- v. **Systematic** – impacts of the activity and results of mitigation measures should be distinguishable from other influences.
- vi. **Adequate** – the proposed monitoring should be robust enough to detect the potential level of change.
- vii. **Realistic** – management actions (mitigation efforts) and monitoring should be achievable

within the timing, resources and capabilities.

- viii. **Analysed and reported** – regular analysis and reporting ensures opportunities to adapt monitoring and management actions.
- ix. **Designed using Before-After-Control-Impact (BACI) to monitor potential impacts** – Monitoring proposals should include:
- indicators or management targets to be monitored or measured
  - location of monitoring sites (impact sites, reference and/or control sites, as appropriate), with number/location of replicates
  - information on how the baseline condition will be determined, against which impacts will be assessed
  - monitoring/sampling methodology and rationale
  - timing (e.g. time of year and frequency) and duration of monitoring programs (e.g. until compliance is demonstrated or during a specific project stage)
  - methods of statistical analysis (if applicable)
  - description of any analytical methods and proposed guidelines or limits of reporting for samples, if applicable (e.g. for water samples).

## Indicators

Deciding what will be monitored and measured is an important step in developing an effective EMP. Correctly defined indicators will enable proponents to track progress and demonstrate compliance.

Indicators are measurable or quantifiable characteristics selected for specific purposes to indicate health or condition of that part of the environment. When selecting indicators, it is useful to consider the range of specific physical, chemical or biological characteristics that can be measured or quantified to represent the health or condition of part of the environment. It is also important to select indicators reflective of the pressure/response relationships within an environment.

Repeat measurement of indicators (i.e. monitoring) enables performance against the desired environmental outcome or objective to be assessed.

For example, reduced water quality can affect seagrass health, with water quality being the pressure and seagrass health, the response. There are numerous characteristics that can be measured for water quality (e.g. light, nutrient concentrations etc.) and for seagrass health (e.g. shoot density, leaf number per shoot, biomass, photochemical efficiency etc.). However, it is not practical for monitoring programs to measure all potential characteristics, so several characteristics may be selected to indicate water quality and similarly for seagrass health.

Selected indicators should be:

- unbiased, meaningful and measurable
- part of the causal relationship between a relevant proposal aspect and the impact on the environmental factor/s
- effective for tracking changes relating to the environmental factor(s)
- scientifically credible

- straightforward and easy to interpret
- consistent and compatible with other recognised monitoring programs in Australia
- monitored or evaluated regularly.

## Adaptive management and early response

### i. Adaptive management

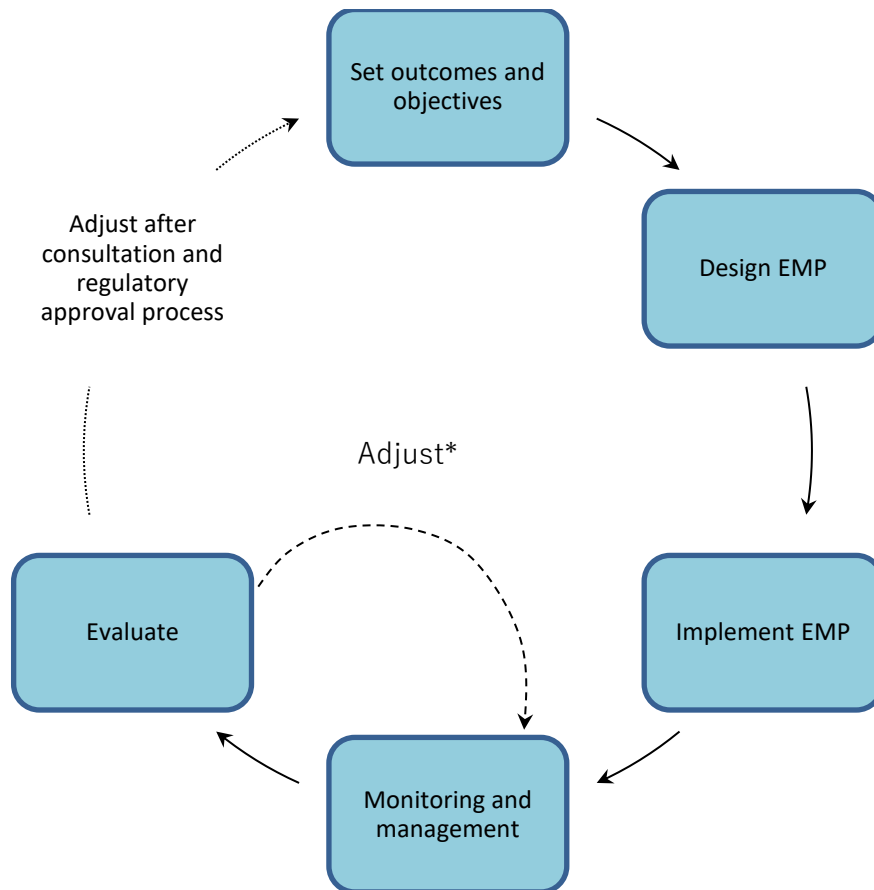
Adaptive management is a systematic approach to improving environmental results and management practices during project implementation through the application of learning from monitoring of outcomes and management actions (Figure 1).

Adaptive management involves more than just reviewing the trigger/threshold criteria and/or management targets following any learning.

Adaptive management in relation to an EMP includes:

- defining the issue and objectives or required outcomes and developing the EMP to address these
- implementing the management and mitigation measures
- monitoring and evaluating the applied management and mitigation against the outcomes and objectives
- adjusting the management and mitigation measures and monitoring (if required) to meet the outcome or objective, based on what is learnt from:
- evaluation of monitoring data or methodology
- review of assumptions and uncertainties
- re-evaluation of risk assessment
- increased understanding of the ecological system
- external changes during the life of the proposal (e.g. technical advances or innovation).

Subject to conditions in Ministerial statements, changes to an EMP may require approval from DWER and may involve consultation with relevant stakeholders.



\*Changes may require regulatory approval and may involve stakeholder consultation

**Figure 1: Adaptive management cycle for environmental management plans**

## ii. Early response indicators, criteria and actions

Proponents may choose to adopt early response indicators as part of their adaptive management approach. Early response indicators provide information on changes that are precursors to an environmental impact. They also support improved understanding and identification of trends in environmental systems. Proponents are encouraged to adopt early response indicators.

Situations where early response indicators may be appropriate:

- where loss or mortality is irreversible in human time scales (e.g. loss of coral communities)
- where impacts may not be detected for a prolonged period (e.g. impacts on recruitment of a long-lived species)
- complex environmental systems where long-term trends need to be established or where consequences of potential impacts are not well understood (e.g. long-term impacts of dewatering on groundwater systems).

Early response criteria are predefined states or levels or early response indicators that are used to initiate early response actions before or at the onset of an environmental impact. Early response actions may include investigations to determine the potential causes of exceedances of criteria, the analysis of additional data sets and/or more frequent monitoring to decrease uncertainty/increase certainty in observed monitoring results.

## Contents of an EMP

The following information is provided to assist proponents to complete the EMP Template. The headings align to the with the key headings in the EMP Template for ease of completion.

### Version control

Include a table at the front of the EMP with version, date and authorisation (name and signature). Indicate if the EMP is for initial or revised approval. Indicate approval from the proponent's Chief Executive Officer or delegate, if required.

## 1 Executive summary

Provide a summary table of the following information (template in Attachment 1 of the EMP Template):

- proposal name
- proponent name
- Ministerial statement number/s (if applicable)
- purpose of the EMP and any requirement for it (e.g. Environmental Scoping Document requirement or implementation condition/s requirement)
- key environmental factor/s, outcome/s and/or objective/s
- Ministerial statement condition clauses (if applicable)
- key components or legal requirements of the plan\*
- proposed construction and operation dates (MM/YYYY)

EMP required pre-construction? Yes/No.

\*Note: This may not be required for EMPs that adequately address the requirements in a table (see Section 2) using the preferred template table (Attachment 2 of the EMP Template).

## 2 Context, scope and rationale

### 3.1 Proposal

Briefly describe the aspect of the proposal that the EMP addresses.

### 3.2 Key environmental factors

For each key environmental factor succinctly describe:

- proposal activities that would affect the key environmental factor
- site-specific environmental value, existing and/or potential uses, ecosystem health condition or sensitive component of the key environmental factor, which will be affected.

### 3.3 Condition requirements

Provide a table of the Ministerial Statement condition requirements (including any outcomes/objectives) if applicable, and in which section of the EMP they are addressed. This may be provided in the components table (see Section 2) or in an Appendix or Schedule if there are

multiple conditions and/or condition clauses.

### 3.4 Rationale and approach

Provide a concise description of the rationale and approach for the EMP. This should not include an impact assessment summary, but rather focus on providing information which directly supports the proposed rationale for monitoring and management actions that aim to address the outcomes and objective/s.

Provide information on:

- Environmental outcome or management objective/s
  - outcomes and objectives should relate to the potential impacts identified in the Environmental Review Document, where applicable
  - describe how monitoring and management will assist in demonstrating compliance with the environmental outcome/s or objective/s.
- Survey and study findings (e.g. specific information about the factor/s of interest that provides context to the rationale for the proposed monitoring of indicators and implementation of management actions)
  - the body of scientific information/site/regional information available
  - regional approach, if used.
- Key assumptions and uncertainties.
- Objective-based EMPs – risk-based approach to identify and prioritise targets and actions.
- Rationale for choice of indicators and/or management actions
  - application of early response indicators and criteria, if used
  - expected changes in the intensity, duration, magnitude or geographic footprint of the impact
  - expected changes and rate of changes in the environment
  - possible effects of issues external to the proposal (e.g. rainfall, land use, other users)
  - expected timeframe for mitigation to take effect.

## 3 EMP components

Broadly, the key components of an EMP include:

- the environmental outcome/s or objective/s
- what is being monitored and why
- how and when the monitoring will be done
- how the results will be evaluated and interpreted
- the actions and timelines for the relevant management response/s.

The key components may be covered under outcome-based or objective-based EMPs, or a combination of both depending on the environmental issue/s and any approval condition



requirements that the document aims to address. The EMP may contain a single outcome or objective or multiple outcomes/objectives that intersect with both broad categories of EMPs.

Proponents should provide detail on the components of the EMP:

- in a table/s (see Attachment 2 of the EMP Templates) and/or
- as succinct text, using clear, unambiguous language.

The table/s may be provided as separate schedules for EMPs that cover more than one operation or Ministerial statement.

**Condition requirements:** Where the EMP is a requirement of a condition, this section must include the relevant condition numbers and the specific details the condition/s (see Attachment 2 in EMP Template).

### 3.1 Outcome-based EMPs

**Outcome** – describe the outcome/s being addressed in the EMP. Where the EMP is a requirement of a condition, this will include any other information required by the condition.

**Indicators** – identify the indicators selected for monitoring to assess potential environmental impacts. This includes identifying the appropriate indicators for trigger criteria, which provide early warning of potential impacts and threshold criteria, which determine the limit of acceptable impact.

**Response actions** – identify the trigger level actions and threshold contingency actions relevant to the outcome/s of the EMP.

**Monitoring** – describe the proposed monitoring plan (e.g. design, methods and analysis) to measure indicators against the outcome and when trigger level actions and threshold contingency actions need to be implemented.

**Reporting** – identify the reporting requirements relating to the implementation of the plan, including timelines that are defined and auditable. Where the EMP is a requirement of a condition, this will include information required by the condition. Reporting may include:

- annual reporting of monitoring results and trends compared to trigger and threshold criteria
- reporting any exceedance of threshold criteria within a set timeframe
- reporting on threshold contingency actions that have been implemented due to the exceedance of threshold criteria.

### 3.2 Objective-based EMPs

**Objective** – define the objective/s that the plan seeks to achieve. The objective/s must relate to the EPA's objective for a specific environmental factor/s. Where the EMP is a requirement of a condition, this will include any other information required by the condition.

**Management actions** – clearly identify the management actions identified to meet and achieve the objective/s. Prioritising management actions using a risk-based approach should be clearly demonstrated, with the greatest effort applied to proposal activities with the highest likelihood of causing environmental impacts where the impact consequence is severe and likely irreversible.

**Management targets** – identify the management targets, with timelines where appropriate. These should be specific, relevant and auditable to determine whether the management actions are effective.

**Monitoring** – describe the monitoring plan (e.g. design, methods and analysis) proposed to determine whether the management targets are effective against the objective/s and the management actions are effective.

**Reporting** – outline the reporting requirements relating to the implementation of the plan, including timelines that are defined and auditable. Where the EMP is a requirement of a condition, this will include information required by the condition. Reporting may include:

- annual reporting of monitoring results and trends against management targets
- reporting of any exceedance of management targets, within a set timeframe
- reporting on the review and revision of management actions.

## 4 Adaptive management and review of the EMP

Identify and discuss the adaptive management approach for the EMP and the process for the review of the EMP (see Part C). Identifying mechanisms that are pro-active and responsive to changing management actions, which directly improve outcomes and objectives are encouraged.

Where the EMP is a requirement of a condition, proponents must seek formal approval from DWER to amend an EMP based on information gained through adaptive management.

### 4.1 Early response indicators, criteria and actions

If appropriate, identify the early response indicators selected as part of the adaptive management approach. Include the necessary early response criteria, early response indicators, and early response actions as part of the adaptive management section of the EMP, including the rationale and approach as recommended for selecting indicators in the beginning of the document.

Early response criteria and actions may be required in an EMP through a condition, where critical environmental factors may be impacted and there is a high degree of uncertainty about likely impacts.

#### Example: Early response indicator and adaptive management

**Outcome-based EMP:** For managing the impacts of a desalination plant brine discharge on seagrass health.

**Outcome:** At the boundary of 200 metres (m) from the ocean discharge point there will be no significant reduction in seagrass health relative to suitable un-impacted reference sites.

**Indicators:** The water quality indicator is the concentration of salt in seawater measured as electrical conductivity millisiemens per centimetre (mS/cm). The seagrass health indicator is the number of shoots per square metre.

**Early response indicator:** The median concentration of salt in brine prior to discharge is greater than a pre-determined level over a three-day period. The pre-determine level is back-calculated from the salinity trigger criterion to be achieved at the 200 m boundary, taking into account the number of dilutions achieved by the discharge over that distance.

**Trigger criteria:** The median concentrations of salt in water at the seabed 200 m from the discharge pipe is greater than the 80th percentile of an un-impacted reference site over a rolling two-week period.

**Threshold criteria:** A 10 percent or greater reduction in the number of seagrass shoots per square metre measured at the 200 m boundary compared to seagrass shoot density measured at the un-

impacted reference sites.

### **Rationale for the choice of the early response indicator**

The brine discharge from desalination plants is negatively buoyant and can increase the salinity of the bottom waters surrounding the discharge point and affect seagrass health. In this example, the trigger is the salinity measured at 200 m from the outfall, and the threshold is impacts to seagrass health also at 200 m from the outfall. The early warning criteria is measurement of the salinity of the brine in the pipe prior to discharge, i.e. prior to any environmental impacts to water quality or seagrass health.

### **Response Actions**

#### **Early Response Actions:**

If the concentration of salt in the brine wastewater is above the predetermined level then check that the equipment is working correctly and make any adjustments necessary to bring the salinity of the brine back down to expected operational levels.

#### **Trigger Criteria Actions:**

If salinity in bottom waters at the 200 m boundary is greater than the 80th percentile of an un-impacted reference site(s), then brine will be diluted with seawater to ensure the trigger criteria is achieved. Seagrass health will also be assessed against the threshold criteria within one month of the trigger criteria exceedance.

#### **Threshold Criteria Actions:**

If seagrass shoot density is decreased by 10 percent or greater compared to un-impacted reference sites, then action should be taken to reduce the impacts of the brine discharge. It would also suggest that the trigger criteria may be too high and need revision. Actions that could be taken to reduce the impacts include seawater dilution prior to discharge, reduced volume of discharge, modification of the diffuser and/or the addition of another diffuser.

### **Monitoring**

Salinity levels will be monitored at two locations:

- in the brine prior to discharge; and
- at multiple points around the 200 m boundary.

In-pipe salinity levels will be measured in-situ using a probe with an instantaneous readout. Salinity levels at the 200 m boundary in the ocean will be measured using telemetered loggers on the seabed. Seagrass health will be routinely monitored annually in January, but if trigger criteria are exceeded then seagrass health will also be monitored within one month of the exceedance.

## **4.2 Stakeholder consultation**

The EPA and DWER expect proponents to consult with stakeholders (including decision-making authorities and other government agencies) when preparing EMPs. The EMP must summarise the stakeholders consulted with, comments and advice received on the key environmental issues, and the proponent's response to these comments/issues, in tabular form.

## **4.3 Changes to an EMP**

If the EMP is a revision of a previously approved EMP, the proponent must provide a table summarising the changes following the example template (see Attachment 3 in the EMP

Templates). The summary table of changes must clearly indicate location and reason/s for changes. A tracked-change version of the revised EMP should be provided where possible and for all minor, non-structural changes to the document.

All changes to an EMP post-assessment must be provided separate to compliance reports and submitted (see Submitting an EMP below).

## Figures, tables, schedules, and appendices

Include the following where relevant to support the information in the EMP:

- Figures – maps, figures and diagrams for explanation and context (e.g. location of monitoring sites, buffers, etc.).
- Tables – summary, key EMP components, Ministerial statement conditions and table of changes for revised EMPs. Examples are provided in the EMP Templates.
- Glossary – include definitions for terms that are not in common use. Terms that are defined in the approved conditions or EPA factors/objectives should retain the same meaning as that used in the condition.
- Schedules (optional) – for EMPs that cover more than one operation or Ministerial statement.
- Appendices – supporting technical information may include baseline survey reports, supplementary modelling reports or scientific studies, risk assessments or other relevant information.

Recommendation: summarising monitoring requirements and management actions in a table will assist with a timely, efficient review and auditing of the EMP. Proponents should ensure that all information is clearly presented and requirements are easily identified in the EMP.

## Index of Biodiversity Surveys for Assessments (IBSA) and Index of Marine Surveys for Assessments (IMSA)

IBSA and IMSA are mechanisms by which all terrestrial biodiversity survey and marine survey information collected for environmental impact assessment under the EP Act will be captured and integrated into a consolidated, indexed and publicly available repository. IBSA and IMSA are administered by DWER on behalf of itself, the EPA and the Department of Mines, Industry Regulation and Safety.

Each time a terrestrial biodiversity survey report or marine survey report is submitted (at any point in the assessment and compliance process under Part IV of the EP Act) an IBSA or IMSA data package should be provided.

The IBSA data package should be submitted via the online IBSA Submissions portal in accordance with the [Instruction and templates: IBSA Data Packages](#). The IMSA data package should be provided in accordance with the [Instruction, template and form: IMSA Data Package](#).

## Submitting an EMP

Ensure that all required information is provided to the EPA Services of the Department of Water and Environmental Regulation (DWER). It is preferred that requests are submitted via [Environment Online](#); however, emailed and postal submissions will be accepted. For assistance in using Environment Online, please contact [EOsupport@dwer.wa.gov.au](mailto:EOsupport@dwer.wa.gov.au).

### Submissions

EO portal: [environmentonline.dwer.wa.gov.au](http://environmentonline.dwer.wa.gov.au)

Email: [EOsupport@dwer.wa.gov.au](mailto:EOsupport@dwer.wa.gov.au)

Post: EPA Services

Department of Water and Environmental Regulation

Locked Bag 10, Joondalup DC, WA 6919

### General enquiries

Telephone: 6364 7000

Fax: 6364 0896

Email: [info.epa@dwer.wa.gov.au](mailto:info.epa@dwer.wa.gov.au)

Website: [www.epa.wa.gov.au](http://www.epa.wa.gov.au)

## Definitions

Words and expressions used in the Instruction: How to prepare an Environmental Management Plan.

Term	Definition
<b>Baseline studies</b>	The environmental studies undertaken prior to an area being subject to pressures or effects from a development or proposal activities occurring. Baseline studies should be undertaken at both the impact site and the reference site prior to potential impacts.
<b>Baseline condition</b>	The environmental conditions prior to being subject to pressures from a development or operation of concern. This may include natural environmental conditions that are largely un-impacted by human influences or the state of the environment just prior to influences and effects of development.
<b>Before-After-Control-Impact (BACI) design</b>	A method to evaluate natural and project-induced change on environmental factors, based on information collected against selected indicators both before and after potential impacts. Both spatial and temporal considerations of selected indicators are important to the BACI design.
<b>Control site</b>	A site located in an area that is unaffected by a pressure being monitored and used for determining baseline conditions/quality prior to becoming influenced by the pressure of concern.
<b>Early response actions</b>	The specific activities selected to implement if early response criteria are exceeded.
<b>Early response criteria</b>	The indicators selected to provide information on changes to the environment that are precursors to an environmental impact.
<b>Early response indicators</b>	The measurable or quantifiable characteristics selected, typically in conjunction with other indicators, to provide information on changes to the environment that are precursors to an environmental impact. They may initiate early response actions before or at the onset of an environmental impact.
<b>Environmental criteria</b>	A term that was previously used in EPA documents to represent the quantitative values indicator and proposal-specific indicators such as location, time period, scale and a baseline or reference. The EPA now refers to this information using the term indicator.
<b>Indicator</b>	A measurable or quantifiable characteristic selected for specific purposes to indicate health or condition of that part of the environment.
<b>Management actions</b>	The identified actions implemented to meet the environmental objective.
<b>Management targets</b>	A type of indicator that is defined to demonstrate that the objective is being met.
<b>Parameter</b>	A term that was previously used in EPA documents to represent measurable or quantifiable characteristics. The EPA now refers to this information using the term indicator.
<b>Reference site</b>	A site located in a similar system, or in a location that experiences similar natural environmental conditions as an area being monitored or managed, but largely un-impacted by human influences and used as a benchmark for determining the environmental objective/s targeted in an EMP. A reference site may not always be available to benchmark and proponents must

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	carefully consider and justify alternative measures.
<b>Threshold criteria</b>	The indicators that have been selected to represent the limit of acceptable impact beyond which the environmental outcome is not being met and where there is likely to be a significant impact on the environment.
<b>Threshold contingency actions</b>	The planned actions for implementation if threshold criteria are exceeded. Threshold contingency actions must be decisive actions that will quickly bring the impact to below the threshold criteria and trigger criteria.
<b>Trigger criteria</b>	Indicators that have been selected for monitoring to provide a warning that if exceeded the outcome may not be achieved. They are intended to forewarn of the approach of the threshold criteria and trigger response actions.
<b>Trigger level actions</b>	The planned actions for implementation if trigger criteria are exceeded, to avoid reaching the threshold criteria and bring the impact back below the trigger criteria.

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## Attachment 1: Example table – Outcome-based EMP\*

### Management of waste water outfall discharges and impacts to seagrass health

**Rationale:** Elevated nutrients in waste streams may increase phytoplankton levels, which reduces water clarity and/or increases epiphytic algal growth on seagrass leaves resulting in a shading effect. This may lead to reduced photosynthesis and thinning of seagrass meadows, which could result in the loss of the seagrass community.

<p><b>EPA Factor:</b> Benthic Communities and Habitats</p> <p><b>EPA Objective:</b> To protect benthic communities and habitats so that biological diversity and ecological integrity are maintained</p> <p><b>Outcome:</b> Beyond a boundary defined as a 100-metre circumference around the outfall there will be no significant reduction in the density of seagrass shoots relative to suitable un-impacted reference sites</p> <p><b>Key environmental values:</b> water quality, seagrass communities</p> <p><b>Key impacts and risks:</b> reduction in seagrass health affecting the wider seagrass community</p>				
Outcome-based				
Indicators:	Response actions:	Monitoring	Timing / frequency of monitoring	Reporting
<ul style="list-style-type: none"> <li>• <b>Trigger criteria</b> - Photosynthetically Active Radiation (PAR)</li> <li>• <b>Threshold criteria</b> - Seagrass shoot density</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Trigger level actions</b></li> <li>• <b>Threshold contingency actions</b></li> </ul>			
Condition clause 6.X				
<p><b>Trigger criteria:</b> The median PAR at the seabed over a rolling two-week period at any site at or beyond the 100-metre boundary is below the 20th percentile of PAR measurements taken at suitable un-impacted reference sites.</p>	<p><b>Trigger criteria action:</b> If seabed PAR over a rolling two-week period is below than the 20th percentile of the reference site then a monitoring program will be implemented to measure seagrass shoot density at the site where the trigger was exceeded.</p> <p><b>Threshold criteria action:</b> If the seagrass shoot density falls below the</p>	<p><b>Indicators:</b> PAR, seagrass shoot density.</p> <p>PAR will be monitored using a logger at the 100-metre boundary, which will be downloaded and serviced every two weeks.</p> <p>Seagrass shoot density will be</p>	<p>PAR will be monitored daily using a logger, starting in month, year, X days pre-construction.</p> <p>Seagrass shoot density will be monitored annually during X month, or in the event of trigger criteria</p>	<p>In the event of an exceedance of a trigger or threshold criteria, the proponent will report the exceedances to DWER within one week of the detected exceedance. In the absence of exceedances, water</p>

<p><b>Threshold criteria:</b> Median seagrass shoot density at any site where the trigger criteria have been exceeded is below the 20th percentile of seagrass shoot density at suitable un- impacted reference sites.</p>	<p>20th percentile of the reference site then waste water quality will be improved within three months by increasing treatment and/or the performance of the diffuser to achieve the trigger criteria and seagrass shoot density will continue to be measured until the threshold criteria has been re-achieved.</p>	<p>monitored in the event of trigger criteria exceedance, or annually if water quality triggers are met.  PAR and seagrass shoot density will be monitored at five impact sites and two un-impacted reference sites.  Location of monitoring sites (see Figure xx)</p>	<p>exceedance.</p>	<p>quality reporting will be on a quarterly basis and seagrass reporting will be annual. All reports are to be sent to the Compliance Branch at DWER.</p>
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