

# Training for Environmental Assessment Guideline No. 17

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## 1. About the training materials

The training notes that follow correlate with the PowerPoint slides presented during the course presentation whereby the slide headings match the headings in the training notes text. While the slides focus on key points, the full corresponding text appears in the notes below. The training materials relate directly to the content of Environmental Assessment Guideline (EAG) no. 17 Preparation of management plans under Part IV of the *Environmental Protection Act 1986*.

**LIMITATION:** these notes are produced by Garry Middle and Angus Morrison-Saunders. The material contained here does NOT represent the policy or views of either the EPA or the OEPA.

## 2. Setting the scene

### Learning objectives

The overall purpose of this training course is to understand how to prepare environmental management plans (EMPs) as part of environmental impact assessment (EIA) processes carried out under Part IV of the *Environmental Protection Act 1986*. These EMPs are directly related to Conditions set in a Ministerial Statement. For this reason, they are called Condition Environmental Management Plans (Condition EMPs).

The more specific objectives of this training are to understand how to establish Condition EMPs that:

- meet the expectations of the Environmental Protection Authority (EPA) and legal responsibilities of proponents in EIA approvals;
- are effective at protecting the environment affected by proponent's activities;
- are informative and succinct; and
- maximise efficiency for preparation and implementation by proponents and for regulatory processing by the Office of the EPA.

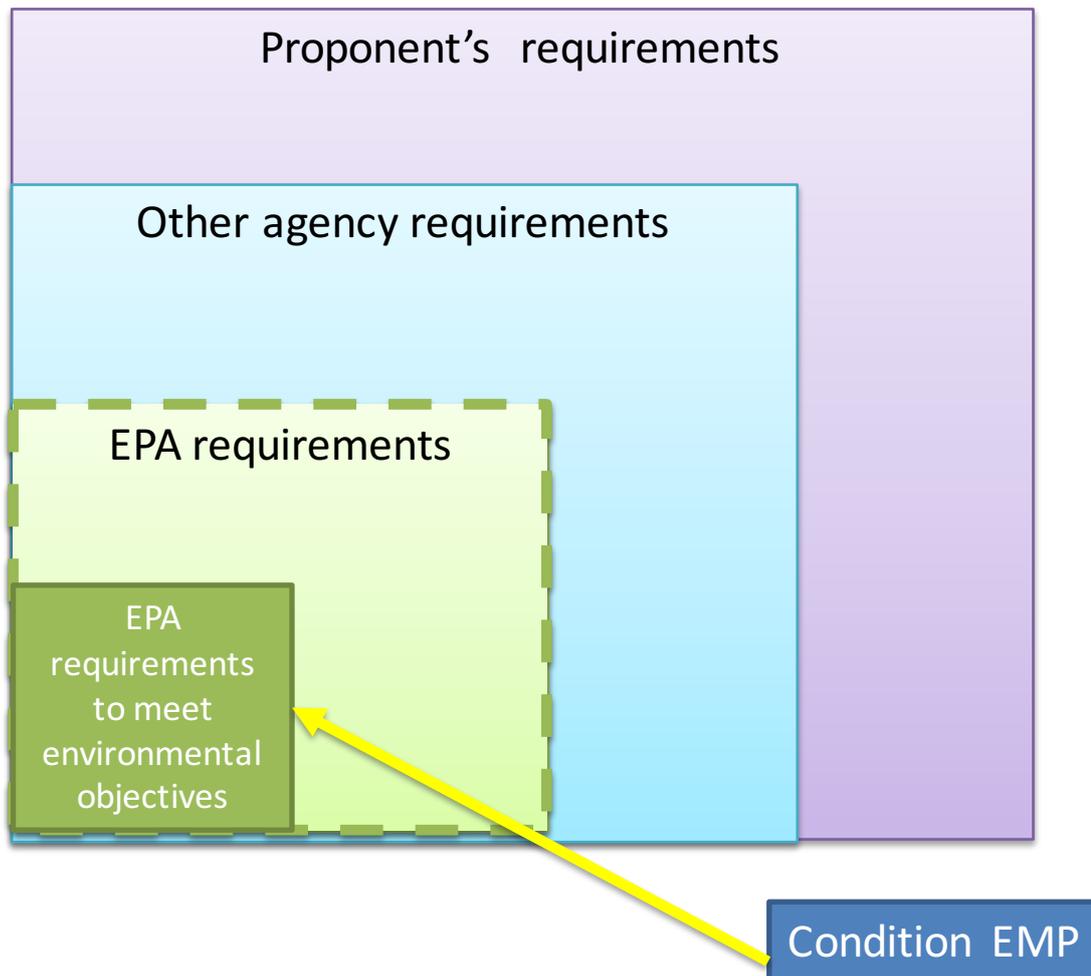
### What EMPs for the EPA used to look like – a personal observation

In the past, EMPs submitted to the EPA for approval served several purposes:

- The requirements of the relevant Condition;
- The requirements of other agencies; and
- The broader management requirements of the proponent.

Form time to time, the requirement of the EPA went beyond the need to show that the EPA's objective could be met. As well, some government agencies used the environmental assessment process and any requirement for an EMP to have their requirements dealt with, which could go well beyond the requirements of the EPA. It is not surprising, therefore, that EMPs became large documents. Figure 1 below summarises what EMPs have become, and what should be the focus of Condition EMPs as set out in EAG 17.

Figure 1: The various purposes of EMPs prior to EAG 17



## Context – EMPs and EIA in Western Australia

To understand the role of EMPs in the EIA process in WA, it is useful to reflect on some of the foundations for the EIA process. The overarching goal for EIA is indicated in the long title of the EPA Act 1986 which states that it is: "An Act to provide for an Environmental Protection Authority, for the prevention, control and abatement of pollution and environmental harm, for the conservation, preservation, protection, enhancement and management of the environment and for matters incidental to or connected with the foregoing". EIA is a key function of the EPA (s16a of EPA Act) to accomplish this goal for new development proposals likely to have a significant effect on the environment. EIA is defined in section 2 of the administrative procedures (EP Act 1986 EIA (Part IV Divisions 1 and 2) Administrative Procedures 2012 *Government Gazette, WA* 7 December 2012, No. 223: 5939-5959) as a whole of proposal life cycle undertaking as follows:

**Environmental impact assessment (EIA)** means an orderly and systematic process for evaluating a proposal (including its alternatives), and its effects on the environment, and mitigation and management of those effects. The process extends from the initial concept of the proposal through implementation to completion, and where appropriate, decommissioning.

Finally the aims of EIA in WA are specified in s3 of the Administrative Procedures 2012 as follows:

- (1) To fulfil the object of the Act, being to protect the environment, having regard to ... [principles in s4A of EPA Act]
- (2) To provide independent, timely and sound advice about the environmental impacts of a proposal to enable the Government to make an informed decision in relation to the implementation of the proposal
- (3) To provide opportunities for public participation and input from DMAs and other relevant government agencies in the assessment of the environmental impacts of a proposal before decisions are taken.

(4) To ensure that the proponents of proposals take primary responsibility for protection of the environment relating to their proposals.

(5) To promote adaptive environmental management, positive environmental outcomes and continuous improvement through learning and knowledge gained through the EIA process and project implementation.

(6) To promote education and awareness in environmental issues.

It is proponents who are primarily responsible for environmental protection (aim 4 above) in Western Australia and must do so to meet the expectations of the EPA and in accordance with legally binding EIA conditions of approval. The EIA process in WA places an emphasis on ongoing and adaptive management along with continuous improvement in environmental performance (aim 5 above) and EMPs are a key mechanism for delivering this.

### 3. Who are the audiences for these Condition EMPs?

The three key audiences for Condition EMPs are:

- The OEPA;
- Involved agencies – i.e. those agencies who need to be consulted in the development of the Condition EMP; and
- Concerned and informed public.

Proponents should, therefore, assume that all of these audiences have good knowledge of the project, and little background information is required.

It is acknowledged that the involved agencies also need to be made aware of the requirements of EAG 17, and that Condition EMPs will now be highly focused. These agencies need to be aware that when they are asked for input as part of the preparation of a Condition EMP, they too need to focus on the requirements of the respective Condition(s) and not any broader requirements of their own agency.

### 4. What is the essence of EAG 17?

#### Focused and precise EMPs

EPA want a concise and focused Condition EMPs that provide only the necessary information to show that a management regime is in place that would ensure the EPA's objective(s) is/are met. Condition EMPs need to be precise, relevant, robust, readable and show accountability.

#### Legality - relevant Ministerial Statement conditions

Condition EMPs relate to specific conditions set in the Ministerial Statement, and, in this sense, are legal documents. As will be discussed below, failure to comply with certain sections of a Condition EMP will constitute non-compliance.

#### Preference for demonstrating measurable environmental outcomes

The EPA has a clear preference for outcome based conditions, and, therefore Condition EMPs that set a quantifiable environmental outcomes or impacts – for example, no loss of a particular species of plant. There is, however, a recognition that setting specific and measurable outcomes isn't always possible. These are where EPA objectives have wording like "minimise impacts as far as practicable". In these latter cases management based Condition EMPs will be required. It may be possible in the future, through better understanding of the relevant environment, to replace management based Condition EMPs with outcome based Condition EMPs.

#### Condition EMPs effectiveness measures - compliance

As noted above, Condition EMPs will have clearly specified measures by which both effectiveness can be measured, and compliance determined.

Outcome based Condition EMPs will require setting robust, credible, easily monitored, and easily interpretable environmental performance indicators – or criteria - of two types:

- **Triggers** – criteria that indicate adverse environmental change is occurring but is not at a critical level. It ‘triggers’ the need for certain remedial management actions to be carried out to avoid further loss and restore the environment. When a trigger level is exceeded there is a risk that the EPA objective may not be met.
- **Threshold** – these are not to be exceeded levels. If a threshold level is reached, decisive and significant ‘contingency’ actions need to be immediately implemented. In these cases, the EPA objective is not being met and non-compliance has occurred.

These environmental criteria act as traffic lights:

- Below the trigger 
- Trigger exceeded 
- Threshold exceeded 

Non-compliance for outcome based Condition EMPs occurs where a threshold is exceeded.

Management based Condition EMPs need to specify management actions that need to be carried out to ensure the EPA’s objective will be met. These actions need to follow the mitigation hierarchy - avoid, minimise, rehabilitate, offset - with a clear preference for avoidance and minimization. As well, measurable management targets should be set to test the efficacy of the management actions. If a management target is exceeded then the management actions should be reviewed and modified as appropriate so as to ensure the EPA’s objective is not compromised. These management targets act as an orange traffic light.

Non-compliance for management based Condition EMPs occurs where any specified management actions are not implemented.

## Monitoring

For both Condition EMPs, monitoring of impacts is required. These related directly to the environmental criteria (triggers/thresholds or management targets).

## Reporting

The following reporting is required:

- Where any exceedance of a threshold criterion or management targets is detected – this needs to be done within some specified period of time following the detection of the exceedance; and
- Annual reporting of results of monitoring and trends, a summary of and exceedances during the year, and any revised management actions implemented.

## Adaptive management and continual improvement

Adaptive management is an approach that recognizes the dynamic and often uncertain nature of ecosystems and how they will respond to change. In short, things don’t always go as planned or predicted. The role of monitoring here is crucial, not only in the requirement to measure outcomes against triggers and threshold criteria, but in ensuring that the environment is protected.

The results of the monitoring should inform on-going management i.e. learning should occur. Where the environment does not respond as predicted, and management responses also don’t go as expected, different management measures should be implemented. In this way management changes, or adapts, to real-life circumstances. It is more than ‘suck it and see’ – it is a systematic approach to management where new management measures are based on the learnings from the monitoring and/or experiences in other similar circumstances.

Where management measures change, Condition EMPs may also need to be modified. Any modification to a Condition EMPs is a formal process.

The use of early response indicators is encouraged – these are indirect but early warning indicators of environmental stress.

## Transparency

Stakeholder consultation is expected as a Condition EMP is prepared. This consultation is not as extensive as was required during the assessment phase of the project approval, but should be targeted to the key audiences: the OEPA, other involved agencies, and the interested and relevant public.

## 5. Case studies

### Introduction

Below are two case studies of typical conditions that require EMPs. **Blue text** is used where the case study is being referred to. **Black text** is used to provide guidance and explanation.

NOTE: These are fictional cases studies and in no way represent either best practice, preferred practice or an EPA endorsed approach. They are provided for teaching and learning purposes only, to illustrate how the EAG can be applied. The examples used set out one of possibly several ways of approaching environmental management or practice for each case study.

### EAG 11 - types of environmental conditions

EAG 11 recognises three types of conditions, which depend on the nature of the EPA’s objective and the preferred way of ensuring the objective is met. Table 1 below summarises the key differences between these three types of Conditions.

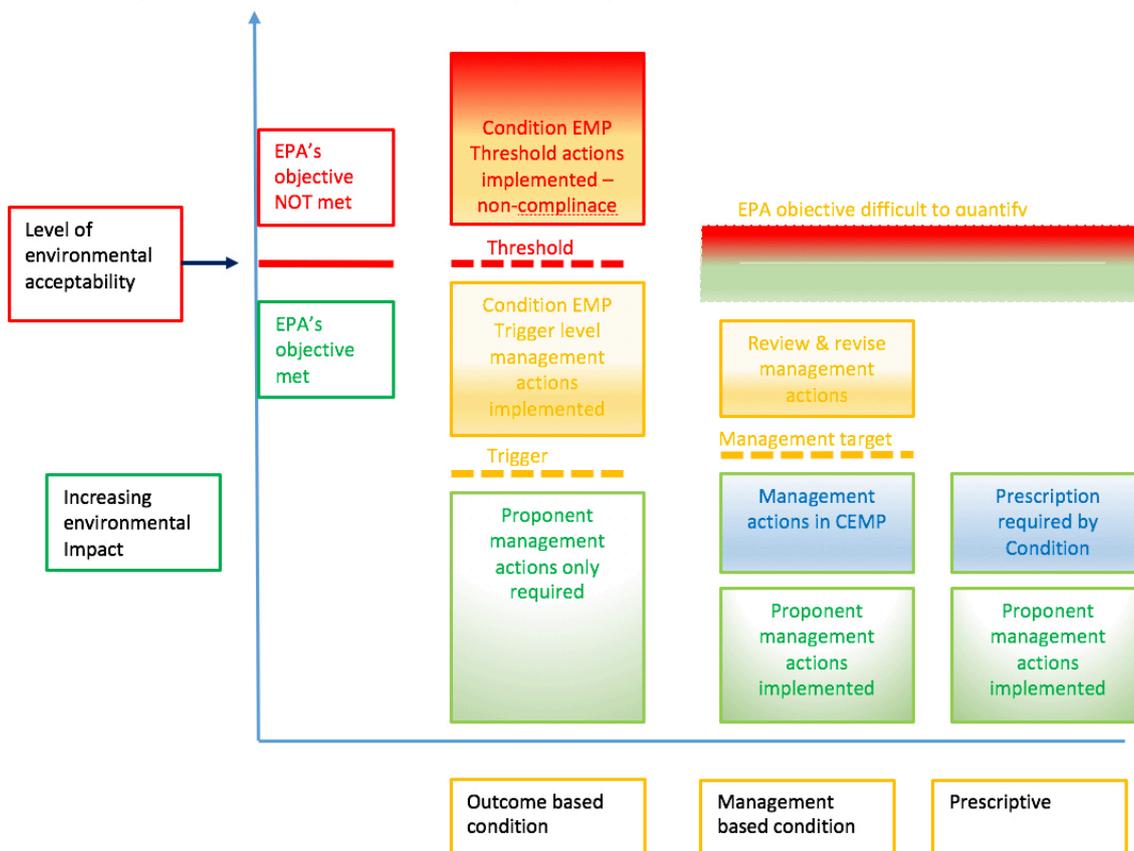
**Table 1: A summary of the three types of environmental conditions as set out in EAG 11**

Type of condition/aspect	Outcome based	Management based	Prescriptive
<b>Measurability</b>	Measurable outcome possible	Measurable <u>not</u> outcome possible	Measurable <u>not</u> outcome possible or required
<b>Typical objective</b>	To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.	Minimise direct and indirect impacts to the regionally significant XY vegetation community as far as reasonably practicable	To maintain the diversity, geographic distribution and viability of fauna at the species and population levels – (Common Bottlenose dolphin)
<b>Condition requirement</b>	Condition EMP required that establishes measurable triggers and thresholds	Condition EMP required that specifies management actions specified & measurable management targets	Condition EMP <u>not</u> required but a prescription set – e.g. “The proponent shall not carry out any dredge activities between 1 November and 31 March in any year”
<b>Meeting EPA objectives – compliance</b>	No exceedance of threshold criterion/ia	Carry out specified management actions	Carry out prescribed management action

Figure 2, below, shows conceptually how management actions, both those included in a Condition EMP and those that are normal best practice but not included in the Condition EMP, and prescriptive actions required by prescriptive based conditions should ensure the EPA's objective are met. It also shows how environmental criteria (triggers, thresholds and management targets) work to avoid the EPA's objective's being compromised.

**Figure 2: A summary of the three conditions types, Condition EMP, environmental criteria and meeting the EPA's objective**

Figure 2: Condition types and meeting EPA objectives



### Case study 1: Outcome-based condition and Condition EPM - Groundwater impacts of below watertable mining

#### The proposal and the Condition

The proposal involves mining up to 30 metres below the water table. After assessing the modelling of groundwater impacts, the EPA concluded that its Environmental Objective for the Environmental Factor, Hydrological processes, will be met subject to the preparation and implementation of a Condition EMP to ensure that a groundwater regime is maintained so that a specific groundwater-dependent ecosystem is not adversely affected. The critical groundwater-dependent ecosystem is 4km from the site.

<b>Condition environmental outcome</b>	<p>The groundwater regime of the area is maintained such that the diversity and ecological function of groundwater-dependent ecosystem at location XX is maintained.</p>
<b>Outcome based condition</b>	<p>10.1 Prior to the commencement of ground disturbing activities within the Mine Development Envelope, the proponent shall prepare and submit a Condition Environmental Management Plan (CONDITION EMP) to the satisfaction of the CEO*. The Condition Environmental Management Plan shall demonstrate that Condition 10.2 has been met.</p> <p>10.2 The implementation of the CONDITION EMP must ensure the environmental outcome that the groundwater regime of the area is maintained such that the diversity and ecological function of groundwater-dependent ecosystem at location XX is maintained.</p> <p>The Condition will require the preparation of a CONDITION EMP that include:</p> <ul style="list-style-type: none"> <li>• trigger criteria and threshold criteria to inform whether the condition environmental outcome is being met;</li> <li>• trigger level actions and threshold contingency actions to implement when relevant criteria are exceeded;</li> <li>• monitoring to assess whether trigger criteria and threshold criteria have been exceeded; and</li> <li>• reporting requirements, including annual reporting procedures, the format and timing for the reporting of monitoring data against trigger criteria and threshold criteria to demonstrate that condition 10.2 has been met, and any non-compliance with the threshold criteria.</li> </ul> <p><i>*Chief Executive Officer of the Office of the Environmental Protection Authority</i></p> <p>10.3 After receiving notice in writing from the CEO that the Plan satisfies the requirements of condition 10.2, the proponent shall:</p> <ol style="list-style-type: none"> <li>(1) implement the requirements of the Plan specified by condition 6-6; and</li> <li>(2) continue to implement the requirements of the Plan until the CEO has confirmed by notice in writing that it has been demonstrated that the objective in condition 6-1 is being and will continue to be met and therefore implementation of the Plan is no longer required.</li> </ol> <p>10.4 In the event that the monitoring specified in the Plan, indicates that the trigger criteria specified in the Plan have been exceeded, the proponent shall:</p> <ol style="list-style-type: none"> <li>(1) immediately implement the trigger management actions specified in the Plan and continue implementation of those actions until the trigger criteria are not exceeded, or until the CEO has confirmed by notice in writing that it has been demonstrated that the outcome in condition 10-1 is being and will continue to be met and implementation of the trigger management actions is no longer required;</li> <li>(2) investigate to determine the likely cause of the trigger criteria being exceeded and to identify any additional trigger management actions required to prevent the trigger criteria being exceeded in the future; and</li> <li>(3) provide a report to the CEO within 30 days of an event, referred to in condition 10.3, occurring. The report shall include: <ol style="list-style-type: none"> <li>(a) details of trigger management actions implemented; and</li> <li>(b) the findings of the investigation required by condition 6-8(2)</li> </ol> </li> </ol>

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Example of Condition EMP based on proposal and conditions

**1. Summary**

This Condition Environmental Management Plan (Condition EMP) is submitted in accordance with Ministerial Statement No.X Conditions 10.1 and 10.2 for \_\_\_ Project by Company \_\_\_ Ltd.

The table below presents the environmental criteria to measure achievement of the condition environmental outcome that must be met through implementation of this Condition EMP.

Title of proposal	[Title from Ministerial Statement or Proposal Name in Scoping Document]
Proponent	[The same name as the proponent for the Ministerial Statement or Scoping Document]
Ministerial Statement number	
Purpose of this CONDITION EMP	The [ ] Management Plan is submitted to fulfill the requirements of conditions 10.1 and 10.2 of the above Statement.
EPA's environmental objective for the key environmental factor/s	To maintain the hydrological regimes of groundwater and surface water so that existing and potential uses, including ecosystem maintenance, are protected.
Condition environmental outcome or proposed measurable outcome	The groundwater regime is maintained such the diversity and ecological function of groundwater-dependent ecosystem at location XX is maintained.  The groundwater levels at XX are not to vary more than 5% from base line conditions
<b>Environmental criteria</b>	
Trigger criteria (proposal-specific)	<u>Trigger criterion 1:</u> The groundwater drawdown footprint, measured as the area contained within the two metre drawdown contour, does not exceed 20 km <sup>2</sup> .  <u>Trigger criterion 2:</u> The drawdown trend at monitoring area T 9 indicates that a 3 m level will not be exceeded within the next 12 months ('Rate of change' criterion).
Threshold criteria (proposal-specific)	<u>Threshold criterion 1:</u> The groundwater drawdown footprint, measured as the area contained within the two metre drawdown contour, does not exceed 32 km <sup>2</sup> .  <u>Threshold criterion 1:</u> A three metre drawdown limit is not exceeded at the point between monitoring areas T 9 and T 10, measured as the average drawdown of two bores.

### Corporate endorsement

I hereby certify that to the best of my knowledge, the Condition EMP provisions within this [Title] Management Plan are true and correct and address the legal requirements of condition 10 of Ministerial Statement No. [X].

[Signature of duly authorised proponent representative]

Name:

Signed:

Designation:

Date:

## 2. Context and scope

### 2.1 What is the Proposal

Can be the key summary from the Ministerial Statement.

### 2.2 Environmental Factors addressed in the EMP

This Condition EMP addresses the potential impacts on groundwater-dependent ecosystem at location XX some 4km away from the mine site. The proposal involves mining up to 30 metres below the water table, and significant dewatering will be required, and the anticipated area of influence because of the the drawdown to the groundwater is no more than 32 km<sup>2</sup>.

The environmental objective set for this factor is that “The groundwater regime is maintained such the diversity and ecological function of groundwater-dependent ecosystem at location XX is maintained”.

### 2.3 Conditions and relevant document sections

Specifically, this Condition EMP is submitted in accordance with Ministerial Statement [xyz], Conditions 10.1 and 10.2 for the [ ] Project:[ ]-. The requirements of these conditions are addressed in the following sections of the CONDITION EMP:

Condition	Section in CONDITION EMP
<p>10-1 Prior to the commencement of ground disturbing activities within the Mine Development Envelope, the proponent shall prepare and submit a Condition Environmental Management Plan (CONDITION EMP) to the satisfaction of the CEO*. The Condition Environmental Management Plan shall demonstrate that Condition 10.2 has been met</p>	
<p>10.2 The implementation of the CONDITION EMP must ensure the environmental outcome that the groundwater regime of the area is maintained such that the diversity and ecological function of groundwater-dependent ecosystem at location XX is maintained.</p> <p>The Condition will require the preparation of a CONDITION EMP that include:</p> <ul style="list-style-type: none"> <li>• trigger criteria and threshold criteria to inform whether the condition environmental outcome is being met;</li> <li>• trigger level actions and threshold contingency actions to implement when relevant criteria are exceeded;</li> <li>• monitoring to assess whether trigger criteria and threshold criteria have been exceeded; and</li> <li>• reporting requirements, including annual reporting procedures, the format and timing for the reporting of monitoring data against trigger criteria and threshold criteria to demonstrate that condition 10.2 has been met, and any non-compliance with the threshold criteria.</li> </ul> <p><i>*Chief Executive Officer of the Office of the Environmental Protection Authority</i></p>	

### 2.4 Rational & approach of Condition EMP

#### 2.4.1 Results of modelling (and/or baseline surveys and studies)

Summary only – e.g.

Modelling of the groundwater was based on X bores monitored over Y months. The computer model used was \_\_\_ and the results peer reviewed by \_\_\_.

The key findings were:

- Maximum likely draw downs at the mine are –
- The likely maximum extent of the drawdown is \_ directly \_ of the site;
- The time of year where drawdowns are expected to be the most is \_\_;
- The critical groundwater-dependent ecosystem is 4km from the site, well outside the expected likely extent of the drawdown

### 2.4.2 Key assumptions and uncertainties

Describe only the main and relevant ones: e.g. nature and extent of aquifer, climatic variability, permeability of formation and therefore response time of aquifer to draw down etc

### 2.4.3 Rationale for choice of environmental criteria

Measurable parameters to be used, location of monitoring sites, frequency of monitoring, scientific basis for approach including where else has it been applied.

### 2.4.4 Rationale for choice of trigger level actions and threshold contingency actions

What is the expected outcomes, including reaction times, of the actions and the evidence in support of this. What, if any additional monitoring will be required.

## 3. Implementation of the EMP

### 3.1 Condition outcome

The groundwater regime is maintained such the diversity and ecological function of groundwater-dependent ecosystem at location XX is maintained.

The groundwater levels at XX are not to vary more than 5% from base line conditions.

NOTE: the outcome is much more specific than the objective and refers to the groundwater regime. This provides a direct link to the environmental criteria below.

### 3.2 Environmental criteria

Two levels of criteria were considered to measure during development of this CONDITION EMP. They are trigger criteria and threshold criteria, which will vary in function. The trigger criteria were set at a conservative level to ensure trigger level actions are implemented well in advance of the environmental outcome being compromised. The threshold criteria were framed to measure achievement of the environmental outcome.

A failure to meet threshold criteria signals the environmental outcome is not being met and implies non-compliance.

Environmental criteria	
Trigger criteria (proposal-specific)	<p><u>Trigger criterion 1:</u> The groundwater drawdown footprint, measured as the area contained within the two metre drawdown contour, does not exceed 20 km<sup>2</sup>.</p> <p><u>Trigger criterion 2:</u> The drawdown trend at monitoring area T 9 indicates that a 3 m level will not be exceeded within the next 12 months ('Rate of change' criterion).</p>
Threshold criteria (proposal-specific)	<p><u>Threshold criterion 1:</u> The groundwater drawdown footprint, measured as the area contained within the two metre drawdown contour, does not exceed 32 km<sup>2</sup>.</p> <p><u>Threshold criterion 1:</u> A three metre drawdown limit is not exceeded at the point between monitoring areas T 9 and T 10, measured as the average drawdown of two bores.</p>

### 3.3 Monitoring

The purpose of monitoring is to inform, through the environmental criteria, if the condition environmental outcome is being achieved and when trigger level actions or threshold contingency actions will be implemented. This section describes how [Company name]\_\_\_ will undertake monitoring to determine the performance against the environmental criteria.

- Location of monitoring sites;
- Frequency of monitoring;
- Etc

Use a table format for this.

Monitoring should also be used to test the modelling.

### 3.4 Implementation of Trigger Level Actions

[Company name]\_\_\_ has developed trigger level actions that would be implemented if the associated trigger criterion signals the need for increased mitigation or protection (Table A). These trigger level actions will be implemented by [Company name] to mitigate and manage impacts so they once again will meet trigger criteria and safeguard threshold criteria.

**Table A: Monitoring to measure the environmental outcome against Trigger Criteria for Groundwater Drawdown**

**Trigger criterion 1:** The groundwater drawdown footprint, measured as the area contained within the two metre drawdown contour, does not exceed 20 km<sup>2</sup>.

Indicator	Method	Location	Frequency	Trigger level actions
Area of groundwater drawdown	Monitoring of water levels	Nine monitoring bores in the six monitoring areas presented in Figure Y	Monthly	<p>On exceeding one or both trigger criteria due to implementation of the proposal, the following trigger level actions will be implemented by Company XY Ltd:</p> <ul style="list-style-type: none"> <li>• Notify the CEO of the OEPA in writing within 21 days;</li> <li>• Implement a combination or all of the following: <ul style="list-style-type: none"> <li>○ review and revise activities causing excess groundwater drawdown;</li> <li>○ should the trend of groundwater drawdown attributable to the proposal continue, reduce the rate of dewatering in the south pit until the trigger criteria are no longer exceeded;</li> <li>○ prepare and submit a Managed Aquifer Recharge Plan.</li> </ul> </li> <li>• Within 90 days of notifying the CEO of the OEPA that one or both trigger criteria have been exceeded, submit a report to the CEO of the OEPA, detailing: <ul style="list-style-type: none"> <li>○ the effectiveness of trigger level actions implemented;</li> <li>○ evidence of the status and updated predicted trend of monitored groundwater levels in the drawdown contour and at monitoring area YY;</li> <li>○ a schedule for ongoing reporting to the CEO of the OEPA until the area contained within the two metre drawdown contour is less than 20 km<sup>2</sup> and the groundwater drawdown trend indicates stabilisation and continuous achievement of trigger criteria;</li> <li>○ a review and updated understanding of the aquifer system, including an update of the groundwater model.</li> </ul> </li> </ul>

### 3.5 Implementation of Threshold Contingency Actions

[*Company name*] has developed a number of threshold contingency actions that would be implemented if the associated threshold criterion signals that the environmental outcome is exceeded (Table B). The threshold contingency actions will be implemented to manage aspects of the proposal and achieve the condition environmental outcome and manage the impact to below threshold and trigger criteria again and hence bring [*Company name*] back into compliance.

**Table B: Monitoring to measure the environmental outcome against Threshold Criteria for Groundwater Drawdown**

Threshold criterion 1: The groundwater drawdown footprint, measured as the area contained within the two metre drawdown contour, does not exceed 32 km<sup>2</sup>

Indicator	Method	Location	Frequency	Threshold contingency actions
Area of groundwater drawdown	Monitoring of water levels	Nine monitoring bores in the six monitoring areas presented in Figure 1	Monthly	<p>On exceeding one or both of the threshold criteria due to implementation of the proposal or potentially due to implementation of the proposal, the following threshold contingency actions will be implemented by Company XY Ltd:</p> <ul style="list-style-type: none"> <li>• Notify the CEO of the OEPA in writing within 21 days;</li> <li>• Implement the following: <ul style="list-style-type: none"> <li>○ cease dewatering at south deposit within seven working days of notifying the CEO of the OEPA that one or both of the threshold criteria have been exceeded until groundwater drawdown achieve both trigger criteria;</li> <li>○ review and amend the mine plan to reduce dewatering in the pit nearest the vulnerable groundwater dependent ecosystem to a level that trigger criteria are met and are continued to be met;</li> <li>○ review and implement managed aquifer recharge.</li> </ul> </li> <li>• Within 90 days of notifying the CEO of the OEPA that one or both threshold criteria have been exceeded, submit a report to the CEO of the OEPA detailing the: <ul style="list-style-type: none"> <li>○ effectiveness of threshold contingency actions implemented;</li> <li>○ evidence of the status and trend of monitored groundwater levels in the drawdown contour and at the point between monitoring bores T9 and T10;</li> <li>○ schedule for ongoing reporting to the CEO of the OEPA until the groundwater drawdown trend stabilises and trigger criteria are met.</li> </ul> </li> <li>• a review of the Condition EMP including an updated understanding of the aquifer system, potential impacts and an updated groundwater model.</li> </ul>

### 3.6 Reporting provisions

#### **Annual reporting**

The environmental outcome will be reported against trigger and threshold criteria (Table C) for dd/mm/yy to dd/mm/yyyy by dd/mm/yy in an annual report. In the event that trigger criteria or trigger and threshold criteria were exceeded during the reporting period, the annual report will include a description of the effectiveness of trigger level actions, and threshold contingency actions (if required) that have been implemented to manage the impact, as well as an analysis of trends.

#### **Reporting on exceedance of trigger criteria and threshold criteria**

In the event of exceedance of any trigger or threshold criteria, Company XY will notify the CEO of the OEPA in writing within 21 days.

**Table C: Annual reporting of the environmental outcome against trigger and threshold criteria**

Table 2-4 Condition Environmental Management Plan Reporting Table		
Key environmental factor: Hydrological processes (Ministerial Statement X, conditions X-1 and X-2)		
Environmental outcome, threshold and trigger criteria set in the Condition EMP	Reporting on the condition environmental outcome, threshold and trigger criteria for [Month 20xx] to [Month 20yy]	Status of achievement <sup>1</sup>
<p>The groundwater regime is maintained such that the diversity and ecological function of groundwater-dependent ecosystem at location XX is maintained.</p> <p><b>Trigger criteria</b></p> <ol style="list-style-type: none"> <li>The groundwater drawdown footprint, measured as the area contained within the two metre drawdown contour, does not exceed 20 km<sup>2</sup>; and</li> <li>The drawdown trend at monitoring area T 9 indicates that a 3 metre level will not be exceeded within the next 12 months ('Rate of change' criterion)</li> </ol> <p><b>Threshold criteria</b></p> <ol style="list-style-type: none"> <li>The groundwater drawdown footprint, measured as the area contained within the two metre drawdown contour, does not exceed 32 km<sup>2</sup> (predicted in the PER, Reference __, Year __);</li> <li>A three metre drawdown limit is not exceeded at the point between monitoring areas T 9 and T 10, measured as the average drawdown of two bores.</li> </ol>	<p>The groundwater regime was <u>maintained</u> / <u>not maintained</u> such that the diversity and ecological function of groundwater-dependent ecosystem at location XX is maintained.</p> <p><b>Trigger criteria</b></p> <ol style="list-style-type: none"> <li>At the end of [Month 20yy] the area contained within the two metres drawdown contour was _____ km<sup>2</sup>;</li> <li>The groundwater drawdown at monitoring area T9 is predicted to remain below _____ metres for the next 12 months.</li> </ol> <p><b>Threshold criteria</b></p> <ol style="list-style-type: none"> <li>At the end of [Month 20yy] the area contained within the area contained within the two metre drawdown contour was _____ km<sup>2</sup>; and</li> <li>The drawdown between monitoring areas T9 and T10 varied between _____ metres and _____ metres from [Month 20xx] to [Month 20yy].</li> </ol>	<p>■ YES or ● NO</p> <p>■ YES or ● NO</p> <p>■ YES or ● NO</p>
<p>Notes:</p> <ol style="list-style-type: none"> <li>The status of achievement of environmental outcome is indicated by the following symbols:  <ul style="list-style-type: none"> <li>■ Environmental outcome achieved</li> <li>● Environmental outcome not achieved</li> </ul> </li> </ol>		

### 3. Adaptive management and review of Condition EMP

[Company name] will also implement adaptive management to learn from the implementation of mitigation measures, monitoring and evaluation against trigger and threshold criteria, to more effectively meet the condition environmental outcome. The following approach will be followed:

Its all about learning – list the items the company will review that could require changes to EMP - eg

- Evaluation of monitoring especially against predicted impacts from modelling;
- How assumptions tested and uncertainties reduced;
- Success of trigger and threshold actions where applied;
- Impact of unanticipated changes; and
- Whether EMP needs to be reviewed.

### 4. Stakeholder consultation

Consistent with the EPA’s expectations for this Condition EMP to align with the principles of EIA, [Company name] consulted with stakeholders while developing this Condition EMP. This section provides a summary of consultation that occurred. The comments raised during consultations with stakeholders were considered in the development of the Condition EMP. The following sections present stakeholders’ comments and [Example Company’s] responses to those comments.

Table D: Stakeholders consulted, comments and responses

Organisation(s)	Type of consultation and date	Comments from stakeholder	[ Company name] Response to Comments/Concerns

## Case study 2: Environmental management-based – impact on regional significant vegetation

### Introduction

The two key differences between the two types of Conditions EMPs are:

- Outcome based Conditions EMPs have measurable criteria, which, if exceeded, prompts previously specified management actions, whereas management based Conditions EMPs have specified management actions that are required to be implemented. Management based Conditions EMPs are also required to have measurable management targets which are meant to be a way of measuring the efficacy of the specified management actions; and
- A proponent with an outcome based Conditions EMP will be in non-compliance if the threshold criteria be exceeded, whereas a proponent with a management based Condition EMP will be in non-compliance if they fail to carry out any of the specified actions.

The management actions chosen to be in a management based Conditions EMP should be risk based: i.e. aimed at activities and environmental aspects of the proposal with highest likelihood of causing environmental impacts or where impact consequence is severe and likely to be irreversible.

Management targets should relate to the higher risk elements that are related to the environmental factor. For example, a proposed coastal development may put at risk the health of a nearby seagrass meadow, and the objective may be “to minimise the impact on the health of this meadow”. A suitable measurable and directly related environmental variable is chlorophyll a – the proponent could use chlorophyll a concentration to test management efficacy and set a specific chlorophyll a concentration as the management target.

### Proposal

Company AB Ltd proposes to develop an Export Infrastructure Project comprising a bulk materials off-loading facility, stockyard and an infrastructure corridor to transport iron ore from existing and proposed stockyards to an existing jetty. The proposed infrastructure corridor includes an access roadway, rail infrastructure, three overland conveyors and utilities.

The proposed infrastructure has been designed and located so as to avoid regionally significant XY vegetation community. The EPA’s environmental management objective here is ‘the proposal is carried out in a manner that minimises impacts to the regionally significant XY vegetation community as far as practicable.’

The EPA concluded that its Environmental Objective can be met subject to the preparation and implementation of a Condition EMP. That was made a condition of Ministerial approval.

### Management-based Conditions

X-1 Prior to the commencement of ground disturbing activities within the Mine Development Envelope, the proponent shall prepare and submit a Condition Environmental Management Plan to the satisfaction of the CEO\*. The Condition Environmental Management Plan shall:

- (1) provide risk-based **management actions** that will be implemented to ensure the environmental management objective in condition X-2 (X-...; and X-....) is achieved;
- (2) specify measurable **management target/s** for determining the efficacy of the risk-based management actions;
- (3) specify **monitoring** to be conducted in relation to management targets;
- (4) specify, in the event that the management targets are not achieved:

- a. additional management actions, including changes to proposal activities that the proponent will implement to prevent the management target/s being exceeded in the future; and
  - b. a procedure for **revision** of management actions and changes to proposal activities. The procedure shall include an investigation to determine the likely cause of the management target/s being exceeded.
- (5) provide annual **reporting** procedures, including the format and timing for verification of the implementation of management actions to demonstrate that condition X-2 (X-...; and X-....) has been met;
- (6) provide for reporting of non-compliance with the implementation of management actions.

### **Regionally significant vegetation**

X-2 The implementation of the Condition Environmental Management Plan required under condition X-1 must ensure that impacts to the regionally significant XY vegetation community are minimised as far as practicable.

*\*Chief Executive Officer of the Office of the Environmental Protection Authority*

## The Condition EMP Table of Contents

<b>1. Summary .....</b>	x
Summary of EMP Elements .....	x
<b>2. Context and Scope .....</b>	x
2.1 What is the Proposal .....	x
2.2 What Environmental Factors does this EMP Address & EPA's objective ? .....	x
2.3 Conditions and relevant document sections .....	x
2.4 Rational & approach of Condition EMP .....	x
2.4.1 Results of baseline studies .....	
2.4.2 Key assumptions and uncertainties .....	
2.4.3 Overall management approach .....	
2.4.4 Rationale for management actions .....	
2.4.5 Rational for management targets .....	
<b>3. Implementation of the EMP .....</b>	x
3.1 Condition objective .....	x
3.2. Risk based management actions .....	x
3.3 Management targets .....	x
3.4 Monitoring .....	x
3.5 Review and revision of management actions .....	x
3.6 Reporting .....	x
<b>4. Adaptive management .....</b>	x
<b>5. Stakeholder Consultation .....</b>	x
<b>6. Supporting Technical Information .....</b>	13

**NOTE: In this case study only the key information is provided rather than the full Condition EMP.**

### 1. Summary

This Condition Environmental Management Plan (CONDITION EMP) is submitted in accordance with Ministerial Statement No.X Conditions 10.1 and 10.2 for \_\_\_ Project by Company \_\_\_ Ltd.

The table below presents the environmental criteria to measure achievement of the condition environmental outcome that must be met through implementation of this Condition EMP.

<b>Title of Proposal</b>	Export Infrastructure Project
<b>Proponent</b>	Company AB Ltd
<b>Ministerial Statement number</b>	Ministerial Statement No.Y
<b>Purpose of this Condition EMP</b>	The Vegetation Management Plan is submitted to fulfill the requirements of condition 6-4 of the above Statement
<b>EPA's environmental objective for the key environmental factor</b>	<b>Flora and Vegetation</b> To maintain representation, diversity, viability and ecological function at the species, population and community level.
<b>Condition environmental objective</b>	Minimise impacts to the regionally significant XY vegetation community as far as practicable in implementation of the proposal.
<b>Management target</b>	1) There is no more than 25% reduction in mean foliage cover of keystone species Z of XY vegetation community at monitoring sites A1, A2, A3 and A4 (refer to Figure x.y) relative to reference sites.

### 3.2 Risk-based management Actions to be Implemented

Proposal activities/aspects which may cause environmental impact to XY vegetation community have been evaluated through a risk analysis. Risk-based management actions with a priority of 'very high' and 'high' are set out in Table E.

**Table E: Risk-based Management Actions that will be implemented to meet the condition environmental objective during the indicated phases of proposal implementation**

Impacts and link to activities/aspects	Risk-based management actions	Risk-based priority	Timeframe / proposal implementation phase/s
<b>Clearing</b>	1. The clearing area is defined by the development envelope	very high, adverse impact	All project phases
<b>Fire</b>	2. Fire management is managed under the requirements of the Fire and Emergency Services Authority and the Western Australian Planning Commission.	very high, adverse impact	All project phases
<b>Changes to surface water flow/sheetflow</b> <ul style="list-style-type: none"> <li>• Degradation due to drought or water-logging</li> <li>• Loss of vegetation</li> </ul> <p><i>(Link to activities/aspects: Diversion in surface water flow (sheetflow), Drainage shadow effect on 'downslope'; Ponding/water logging on 'upslope')</i></p>	3. Conduct hydrological modelling of sheetflow, taking landform and different rainfall scenario's into account, relative to the location of XY vegetation community, to identify: <ul style="list-style-type: none"> <li>• the preliminary positions and types of culverts to be implemented;</li> <li>• design of permeable levee banks;</li> <li>• estimations of floods and sheet flow for sizing of drainage structures; and</li> <li>• position and sizes of erosion and scour protection measures.</li> </ul>	high, adverse impact	Engineering design
	4. Conduct ground-truthing of the final alignment to validate the specific locations and types of culverts to be included, as well as positions of erosion and scour protection measures, and size and design of permeable levee banks, relative to XY vegetation community.		Engineering design
	5. Include the validated locations and types of culverts, erosion and scour protection measures, drainage structures and permeable levee banks in the engineering design for roads and rail infrastructure relative to XY vegetation community.		Engineering design
	6. Inspect culverts and levee banks on an annual basis and after major rainfall events to detect loss of functionality or damage and effect repairs.		After construction Operations

### 3.3 Environmental criteria – management targets

A management target will be employed to measure the efficacy of the management actions and report on relative to the condition environmental objective.

[Figure x.x – Final lay-out of road and rail infrastructure relative to XY vegetation community.]

The management target in Table F will measure the efficacy of the management actions implemented relative to the condition environmental objective.

**Table F: Management targets to measure the efficacy of management actions relative to the environmental objective**

<b>Condition environmental objective</b>	Minimise impacts to the regionally significant XY vegetation community as far as practicable in implementation of the proposal.
<b>Management targets</b>	1) There is no more than 25% reduction in mean foliage cover of keystone species Z of XY vegetation community at monitoring sites A1, A2, A3 and A4 (refer to Figure x.y) relative to reference sites.

### 3.4 Monitoring

The purpose of monitoring is to inform, through the management target, if management actions are effective relative to the condition environmental objective. This section describes how Company AB Ltd will undertake monitoring to determine whether the management target and the condition environmental objective are achieved (Table Z).

Data collected on all parameters through monitoring as indicated in Table Z, will be recorded in the Export Infrastructure Proposal - Environmental Management Database. Data will be retained in this database for the life of the proposal and at least seven years following implementation of the Mine Closure Plan.

Data will be analysed to produce monthly management reports that will include an analysis of trends over the life-of-project, graphs and a section on exceedances/non-compliances. All monthly management reports will be available on request for verification of implementation. Monitoring data and monthly management reports will be employed to report against the management target (Table G).

**Table G: Monitoring to assess the efficacy of management actions implemented**

Management target 3: There is no more than 25% reduction in mean foliage cover of keystone species Z of XY vegetation community.			
Parameter	Method to collect data	Frequency	Location
Track implementation of management actions 3 to 6 (Table 1)	Check sign-off of actions	On completion	Master project implementation plan Area indicated in Figure x.x
Foliage cover	Digital canopy photography	Quarterly for the first three years, thereafter annually	Monitoring sites A1, A2, A3, A4 and reference sites (as indicated in Figure x.y)
Health and condition of key stone species Y <ul style="list-style-type: none"> <li>- Leaf colour</li> <li>- Presence of foliage pathogens</li> <li>- Etc.</li> </ul>	Visual inspection	Three-monthly	Monitoring sites A1, A2, A3, A4 and reference sites (as indicated in Figure x.y)
Habitat condition of key stone species Y <ul style="list-style-type: none"> <li>- Visible water logging</li> <li>- Erosion</li> </ul>	Visual inspection	Three-monthly; and After major rainfall/flooding events	Monitoring sites A1, A2, A3, A4 and reference sites (as indicated in Figure x.y)

[Figure x.y: Location of monitoring sites A1, A2, A3, A4 and reference sites]

### 3.5 Review and revision of Management Actions

In the event that any one of the management targets and the environmental management objective are not achieved, Company AB Ltd will implement the following procedure:

- Investigate and identify the likely cause of exceedance of the management target or impacts on XY vegetation community;
- In the event that the cause of exceedance relates to the activities/aspects identified in Table 1, revised/additional management actions and changes to proposal activities will be identified. The list of revised/additional management actions provided below has already been identified. This list may be supplemented with additional actions, depending on the cause of exceedance;
- In the event that the cause of an impact to XY vegetation community relates to proposal activities/aspects not identified in Table X, the risk assessment will be reviewed and revised risk-based priorities and management actions will be provided (revision of Tables X and Y);
- In the event that the cause of exceedance does not relate to proposal activities/aspects, the cause will be noted and implications for monitoring considered. A revised Vegetation Community Management Plan will be submitted will be submitted, if necessary.
- An implementation schedule will be identified for the revised/additional management actions; and
- A revised Vegetation Community Management Plan will be submitted to the CEO of the OEPA within 90 days of reporting of the exceedance of management targets.

## 7. Comparing the Tables of Contents of the two types of Condition EMPs.

The key differences are highlighted in green

Outcome based Condition EMP	Management based Condition EMP
<b>1. Summary</b>	<b>1. Summary</b>
Summary of EMP Elements	Summary of EMP Elements
<b>2. Context and Scope</b>	<b>2. Context and Scope</b>
2.1 What is the Proposal	2.1 What is the Proposal
2.2 What Environmental Factors does this EMP Address & EPA's objective ?	2.2 What Environmental Factors does this EMP Address & EPA's objective ?
2.3 Conditions and relevant document sections	2.3 Conditions and relevant document sections
2.4 Rational & approach of Condition EMP	2.4 Rational & approach of Condition EMP
2.4.1 Results of baseline studies	2.4.1 Results of baseline studies
2.4.2 Key assumptions and uncertainties.	2.4.2 Key assumptions and uncertainties.
2.4.3 Overall management approach.	2.4.3 Overall management approach.
2.4.4 Rationale for environmental criteria	2.4.4 Rationale for environmental criteria
2.4.5 Rational for choice of actions.	2.4.5 Rational for choice of actions.
<b>3. Implementation of the EMP</b>	<b>3. Implementation of the EMP</b>
3.1 Condition outcome	3.1 Condition outcome
3.2 Environmental Criteria – Triggers and thresholds	3.2 . Risk based management actions
3.3 Monitoring	3.3 Management targets
3.4 Implementation of Trigger Level Management Actions	3.4 Monitoring
3.5 Implementation of Contingency Actions	3.5 Review and revision of management actions
3.6 Reporting	3.6 Reporting
<b>4. Adaptive management</b>	<b>4. Adaptive management</b>
<b>5. Stakeholder Consultation</b>	<b>5. Stakeholder Consultation</b>
<b>6. Supporting Technical Information</b>	<b>6. Supporting Technical Information</b>

## 8. An example of an existing ‘idealised’ EMP and how it could be modified to become a Condition based EMP

Below is a table of contents of an idealised typical (albeit quite short) existing EMP.

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<b>8. Responsibilities.....</b>	<b>20</b>
<b>9. Definitions and Abbreviations.....</b>	<b>20</b>
<b>10. References.....</b>	<b>22</b>
<b>Appendix 1 Site Specific Management Actions .....</b>	<b>23</b>

Over the page is an edited version of the table of contents indicating which sections could be deleted (with a red oval with a line through it) or shortened significantly (a small red rectangular box). Also shown is where the sections covering triggers and thresholds and the triggers and thresholds management actions. It would be possible to reduce this EMP to a 10 page

## Contents

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5.1. Adaptive Management Framework	12
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Triggers & Thresholds

Triggers & Thresholds  
Actions