Protecting the marine environment — A guide for the petroleum industry
Discussion paper for public comment

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The Environmental Protection Authority
Westralia Square,
141 St George's Terrace
PERTH WA 6000
Attention: Mr D Betts

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CONTENTS

Page

Summary i

1. Introduction 1

1.1 Objectives 1

1.2 Historical context 1

2. Resource maps and delineation of sensitive marine environments 2

3. Protection of sensitive parts of the marine environment 7

3.1 Marine nature reserves and marine parks 7

3.2 Environmentally significant areas (ESAs) 7

3.3 Buffer 8

4. Referral and environmental assessment of proposals 8

4.1 Petroleum exploration 10

4.2 Petroleum production 11

5. Possible sources of marine oil spills off Western Australia 12

6. Organisations in WA concerned with oil spill policies 13

7. Oilspill clean-up procedures 14

8. References 15

Figures

1. Arrangement of marine protection zones 3
2. Sensitivity of the marine environment and levels of protection 4
3. Sensitive marine environments of Western Australia 5
4. Sensitive marine environments in south-west region of Western Australia 6

Table

1. Summary of petroleum activities and levels of assessment by EPA in sensitive marine environments 9

Appendices

A. Links between this report and Bulletin 104
B. Sensitive marine environments of Western Australia
C. Generic guidelines for the preparation of a Consultative Environmental Review for a proposed offshore petroleum exploration drilling programme
D. Typical environmental conditions for offshore petroleum exploration drilling proposals within environmentally significant areas
E. Use of dispersants on floating oil in sensitive marine environments

Summary

This report aims to:

- delineate sensitive parts of the marine environment;
- enable protection of sensitive parts of the marine environment, particularly from oil pollution;
- indicate levels of environmental assessment likely to apply to petroleum exploration or production proposals in sensitive marine environments;
- outline environmental conditions likely to be attached to approvals of proposals;
- facilitate planning for reaction to oilspills or other pollution events; and
- determine when the use of oil dispersants is appropriate.

This document replaces Bulletin 104, published by the former Department of Conservation and Environment in 1984. It incorporates more accurate information on the sensitive parts of the marine environment and current knowledge on the impacts of offshore petroleum exploration and development. The Environmental Protection Authority has been able to use these improved data to achieve more efficient handling of proposals while increasing realistic levels of protection for sensitive marine resources.

Many of the concepts and principles discussed, although developed for the petroleum industry, are applicable to other types of marine activities.

The sensitive marine environments were delineated by using a system based on the following criteria: areas of international, national, or State conservation/ecological significance; areas of high recreational use and attractiveness or of special educational and scientific interest; and marine resources of high economic importance for industries dependent on them.

The former system of offshore zones designed to protect sensitive marine environments has been simplified. There are now only three zones:

(1) Marine Park/Marine Nature Reserve;

(2) Environmentally Significant Area; and

(3) Buffer.

Beyond the Buffer are the open waters, which attract no special consideration.

The Environmental Protection Authority assesses proposals to ensure that sensitive marine environments are protected. The Authority's position on referral and assessment of petroleum proposals is:

- Seismic survey proposals which are within Marine Parks, Marine Nature Reserves and Environmentally Significant Areas are required to be referred to the Environmental Protection Authority either by the proponent or the Department of Minerals and Energy. Seismic proposals outside these areas are not required to be referred. Seismic proposals within Marine Parks or Marine Nature Reserves may be recommended for approval by the Authority where it is clear they form part of a survey which is centred on prospects which can be accessed from outside the park or reserve. Seismic proposals would not normally

require formal assessment but may do if they infringe on Marine Parks or Marine Nature Reserves.

- Exploration drilling proposals within Marine Parks, Marine Nature Reserves, Environmentally Significant Areas and the Buffer are required to be referred to the Environmental Protection Authority either by the proponent or the Department of Minerals and Energy. Drilling may be recommended as environmentally acceptable from dry land portions of the Marine Park or Marine Nature Reserve or from outside the boundary using directional techniques. The proponent would have to satisfy the Environmental Protection Authority that the direct and potential environmental impacts of the proposal would be acceptably low. Drilling within all these zones except the Buffer would normally require formal assessment (ie the preparation of an environmental impact assessment document for public review and submissions to assist the Environmental Protection Authority in its assessment of the proposal).

- All development and production proposals are to be referred either by the proponent or the Department of Minerals and Energy and would require formal assessment. The Environmental Protection Authority would recommend against drilling and production proposals in the waters of Marine Parks and Marine Nature Reserves.

A high level of environmental information has accrued in some areas as a result of earlier formal assessment of similar petroleum exploration proposals. In the Buffer or Environmentally Significant Areas the Environmental Protection Authority may decide that further formal assessment of a subsequent proposal is unnecessary provided that the proponent accepted appropriate statutory environmental conditions and that the Department of Minerals and Energy imposed them under its legislation. Environmental information on the proposal would still need to be made available to all interested parties.

Environmental conditions likely to be applied to proposals recommended for approval would vary, depending on the kind of activity proposed, distance from sensitive marine environments and timing. They are discussed in Section 4 and presented in Appendix D.

The report discusses possible sources of marine oil spills that could affect Western Australia and the likelihood of their occurrence. The organisations responsible for decision making to combat a spill, and their interaction, are outlined.

The report discusses the Environmental Protection Authority's preferred response options to oil spills, which are to:

(1) contain and remove the oil wherever possible;

(2) if containment is not possible:
    - do nothing if the slick is moving away from sensitive marine environments;
    - where the slick is heading towards a particularly sensitive marine environment apply dispersant as soon as practicable, away from shore and in waters deeper than 20 metres ;
    - allow an oil slick to beach if there is more harm likely to accrue from the use of dispersant in an environment which is sensitive to it. A decision would then need to be made on whether to physically the beached oil or to leave it to degrade naturally.

1. Introduction

1.1. Objectives

This report aims to:

- delineate sensitive parts of the marine environment;
- enable protection of sensitive parts of the marine environment, particularly from oil pollution;
- indicate levels of environmental assessment likely to apply to petroleum exploration or production proposals in sensitive marine environments;
- outline environmental conditions likely to be attached to approvals of proposals;
- facilitate planning for reaction to oilspills or other pollution events; and
- determine when the use of oil dispersants is appropriate.

1.2. Historical context

This document has evolved from Bulletin 104, which was published by the Department of Conservation and Environment (now the Environmental Protection Authority or EPA) in 1984[1] as a revised version of Bulletin 71[2]. Bulletin 104 listed 67 environmentally significant areas around the Western Australian coast and described procedures adopted in WA to prevent or minimise damage to the marine environment by oil spilt from shipping, petroleum exploration/production activities and other sources.

Over the past several years it has become apparent that parts of Bulletin 104 are out of date. There is now more knowledge and experience of the behaviour of oil spills and of the means of protecting sensitive areas in Western Australian waters from oil spills. Changes to environmental protection and assessment procedures have evolved to deal more effectively and efficiently with the increased offshore petroleum activity. As well, there are improvements in the understanding of Western Australia's coastal and offshore environmental features which have necessitated revisions to the previously published maps. This bulletin revises these issues, simplifies the zoning concept and hence supersedes Bulletin 104. Further information on the evolution of this bulletin from Bulletin 104 is included as Appendices A and B.

During the revision of this document close liaison has been maintained with the Marine Park Selection Working Group, co-ordinated by the Department of Conservation and Land Management. The task of that group is to provide scientific advice to identify areas with potential for reservation as part of a system of marine Parks and Marine Nature Reserves representative of the environments in Western Australian State waters. The report of the Marine Parks Selection Working Group is to be released later this year for public comment.

The oil industry has contributed significantly to the environmental inventory of the North West Shelf area and is to be commended for its responsiveness to increasing public environmental awareness which have occurred over the past few years.

Activities such as tourism, mariculture, fishing, trawling and some shore-based activities also could significantly affect the marine environment. The data on sensitive marine environments and mechanisms for their protection could also be applied to non-petroleum development proposals. However, because of the increase in offshore petroleum exploration and development, the Environmental Protection Authority has assessed petroleum-based proposals more often. The actual and potential impacts of these have also been the most studied. Because most new proposals with the potential to affect sensitive parts of the marine environment continue to come from the petroleum industry, this report concentrates on providing guidance to it. Bulletins for other industries/activities with the potential to affect the marine environment may be developed later. Meanwhile, this bulletin may be used as a general guide for those other activities.

2. Resource maps and delineation of sensitive marine environments

For the purpose of this report the marine environment of Western Australia includes all State coastal waters up to the limit of the highest tides. The marine and coastal resources of Western Australia have been identified and sensitive marine environments defined to enable informed decisions to be made in case of events which could threaten the marine environment. In this document a Sensitive Marine Environment (SME) is a marine or intertidal area which has been classified because it contains especially diverse or productive plants, animals or waters of special significance. Sensitive Marine Environments encompass Marine Parks and Marine Nature Reserves, which have been given special administrative status for environmental protection, and Environmentally Significant Areas (ESAs), which contain environmentally sensitive parts but do not have any administrative status at present (Figures 1 and 2). The SMEs are listed in Appendix B and shown in Figures 3 and 4.

Sensitive Marine Environments are classified according to the five broad criteria outlined below, any one of which is sufficient for an area to be classified as sensitive. These criteria are used as a guide rather than as an exhaustive list or mandating designation of an area as a Sensitive Marine Environment:

(I) Environments of international ecological / conservation significance

-internationally recognised protected areas such as World Heritage areas, Biosphere reserves, Ramsar wetlands and areas of significance for the conservation of internationally protected species;

(N) Environments of national or State ecological / conservation significance

-includes major coral / limestone reef, seagrass and mangrove ecosystems, as well as marine nature reserves, marine parks, aquatic reserves and may include the marine components of national parks and nature reserves.

(E) Environments where the biological resources are of major economic significance

- includes major commercial fisheries, important identified nursery areas for commercial species, mariculture leases.

(C) Environments of major cultural significance

- includes environments of major recreational and/or historical value, scenic beauty and areas important as Aboriginal subsistence fisheries; and

(S) Environments of major scientific and educational significance

- for example, Abrolhos Islands (major scientific significance) and / or areas of educational value close to major population centres.

Comments on the most sensitive times for specific locations have been included. For example, coral and rock lobster spawning periods, turtle egg laying or sea bird nesting times, seasonal influxes of migratory wading birds or peak times for use of a bathing beach.

In addition to the environmental resources, details of hydrological, meteorological and coastline characteristics can be considered with the map during an oil spill for use in assessing where, on the basis of current knowledge, dispersant application will be recommended or discouraged (see Section 7).

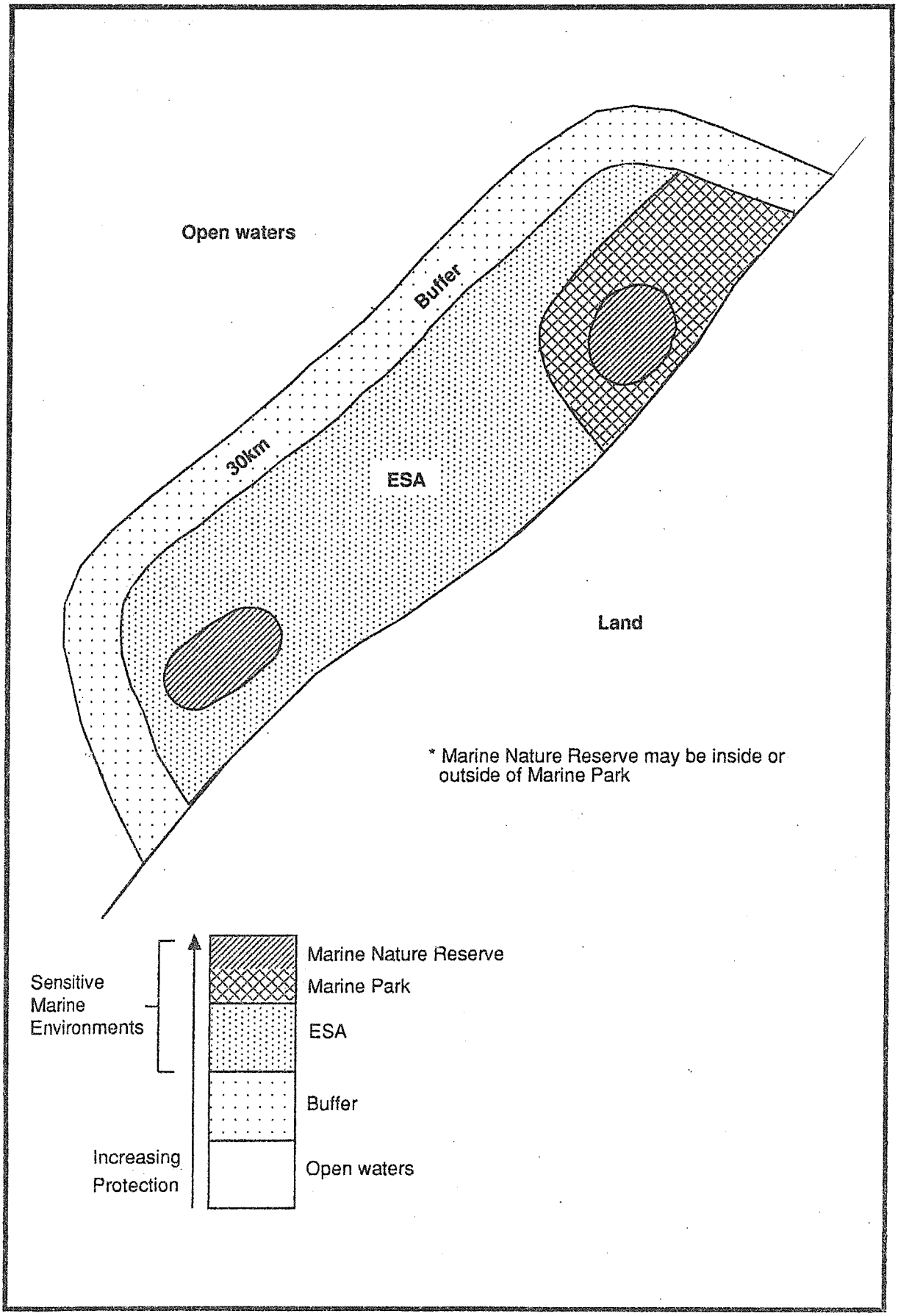

Figure 1: Arrangement of marine protection zones

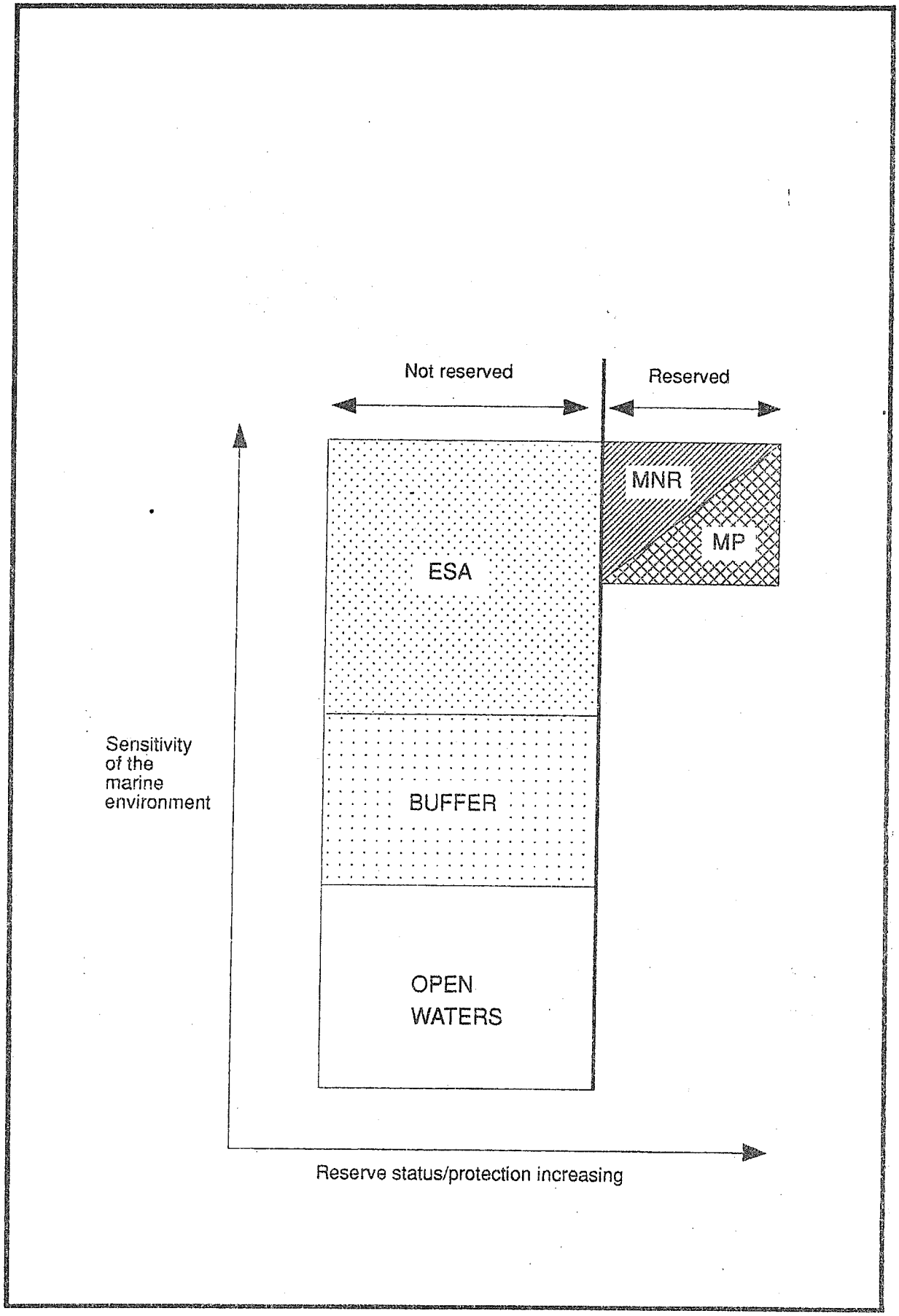

Figure 2: Sensitivity of the marine environment and level of protection

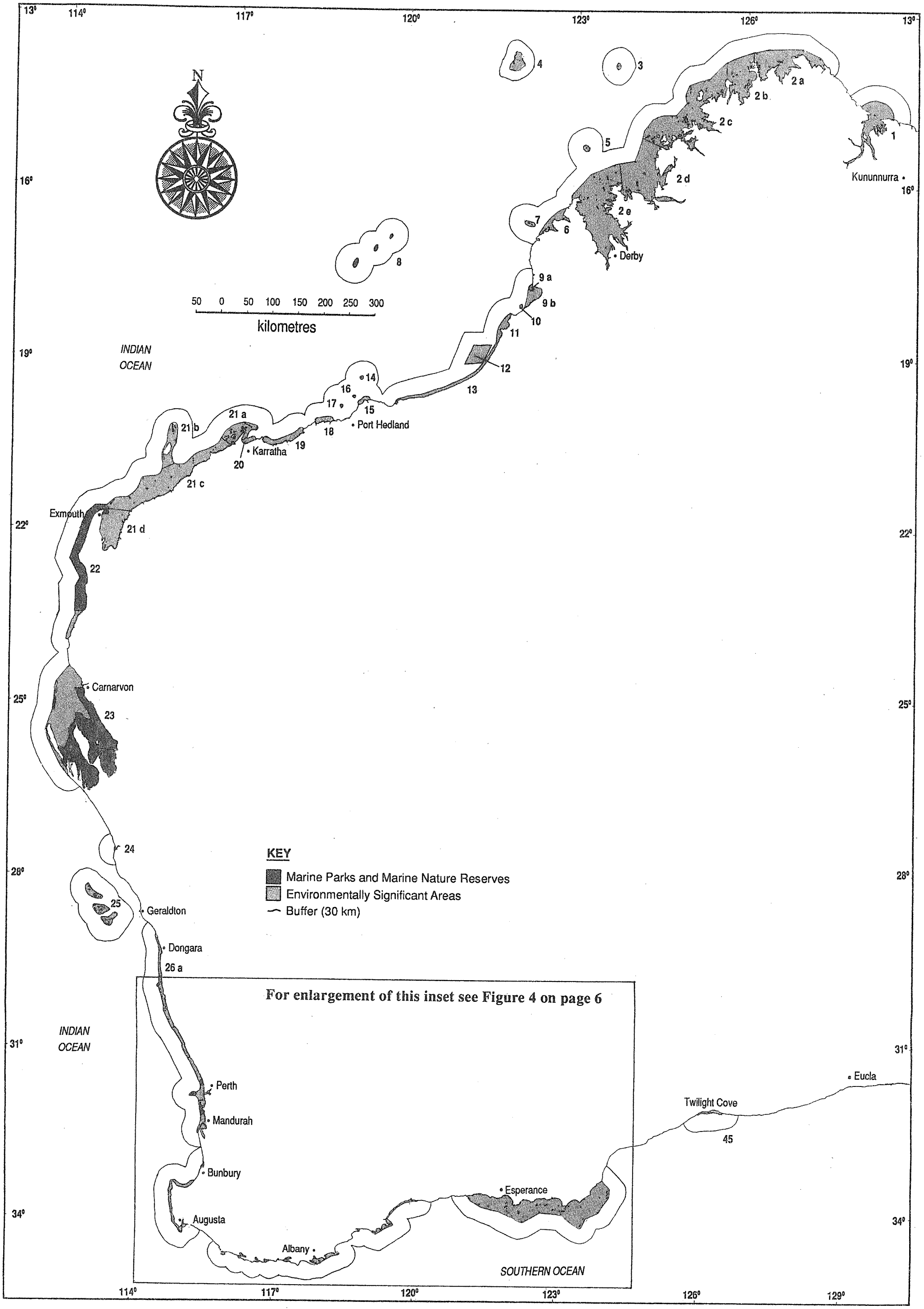

Figure 3: Sensitive marine environments in Western Australia (see Appendix B for locality number guide)

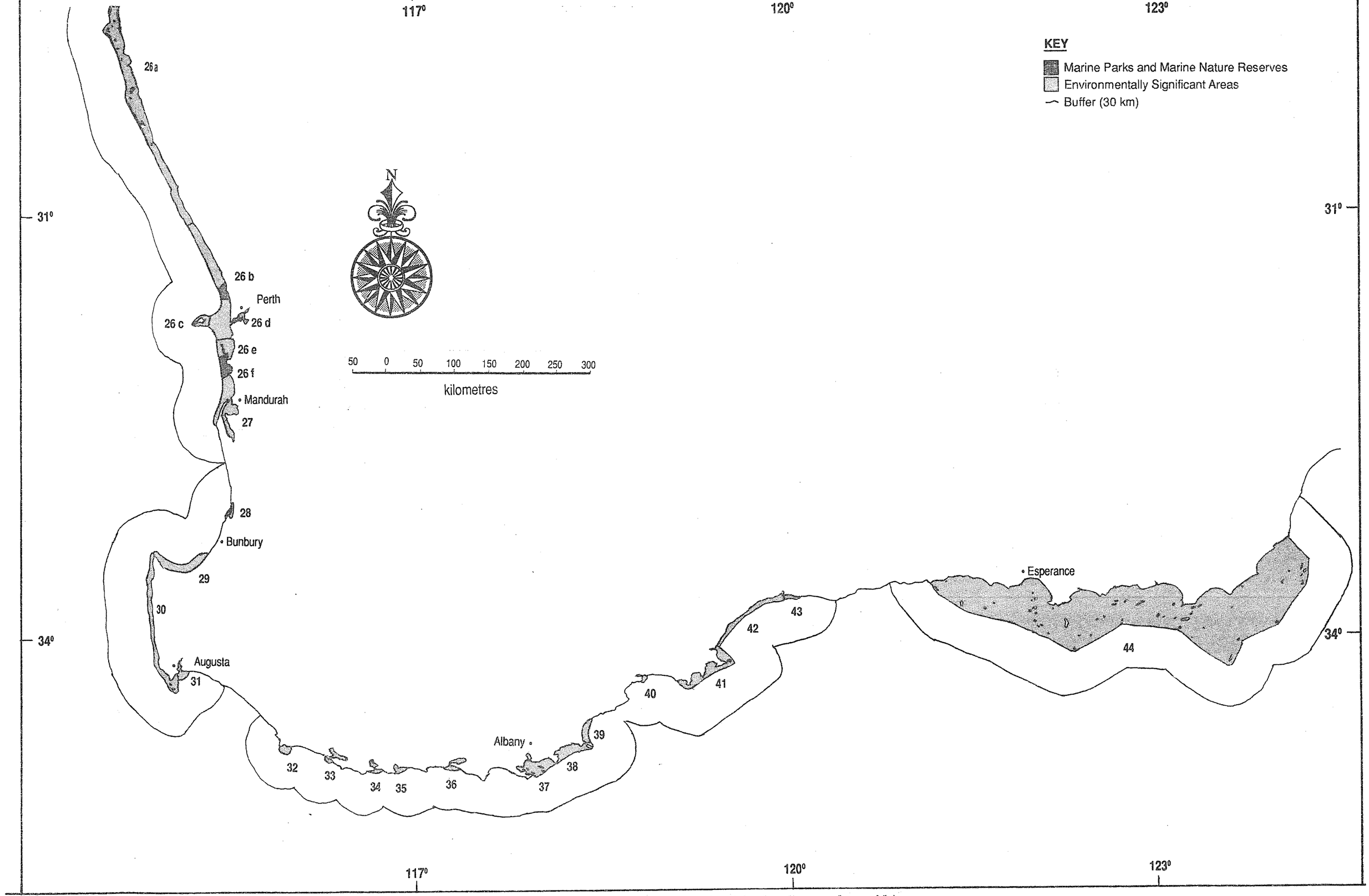

Figure 4: Sensitive marine environments in the south-west region of Western Australia (see Appendix B for locality number guide)

3. Protection of sensitive parts of the marine environment

The system of protection of sensitive parts of the marine environment described in Bulletin 104 has been revised and simplified to three zones, with open waters beyond:

- MARINE PARK and MARINE NATURE RESERVE;
- ENVIRONMENTALLY SIGNIFICANT AREA (ESA).

The above zones are sensitive marine environments and are protected from oilspills by a:

- BUFFER.

The zoning in Bulletin 104 has been simplified by substituting one 30km wide buffer for the three former divisions (Special Condition Zones-inner and outer zones-and the Immediate Protection Zone, total width 50km). The reduction of the buffer from 50km to 30km does not mean that sensitive marine environments will be less protected than before. Improved understanding of oilspill dispersion under local conditions has allowed the calculation that 30km is the maximum distance oil is likely to move in 24 hours. The rationale for the revised width of 30km is discussed in Section 3.3.

The highest protection goes to Marine Nature Reserves and Marine Parks, followed by ESAs and lastly the Buffer. (There is nothing in the Buffer that merits special protection; it is there to protect the more vulnerable parts of the environment delineated by ESAs, Marine Parks or Marine Nature Reserves). Waters outside these areas are known as Open Waters and attract no additional protection.

Figure 1 sets out the relationship of each of these zones to the others and Figure 2 shows the environmental sensitivity of the zones versus levels of special protection by virtue of the area's tenure and purpose under the Land Act (1933).

3.1. Marine nature reserves and marine parks

The Marine Park and Marine Nature Reserve system is being established in Western Australia largely by the concept of 'representative reserves', rather than 'whole-of-region' reserves. This will help reduce the potential for conflict with ocean users such as the petroleum industry, because the reserve size will generally be smaller. As a result, many sensitive marine environments which still have significant conservation, recreation, or fishery resource value will not have the protection of Marine Park or Marine Nature Reserve status. Instead they will be included in ESAs, where case-by-case evaluation of proposals and strict operating conditions will be required to protect the environment.

Areas known as Marine Nature Reserves and Marine Parks comprise existing and proposed* Marine Nature Reserves and Marine Parks. They are vested in the National Parks and Nature Conservation Authority (NP&NCA) and managed by the Department of Conservation and Land Management (CALM). Marine Nature Reserves are for: (a) conservation or restoration of the natural environment, (b) protection, care and study of the indigenous flora and fauna and (c) the preservation of any feature of archaeological, historical or scientific interest. Marine Parks have been established for any one or more of the criteria for Marine Nature Reserves, as well as for public recreation. Other activities consistent with park status, such as commercial fishing, have sometimes been permitted.

3.2. Environmentally significant areas (ESAs)

ESAs contain marine or near-coastal resources which are potentially sensitive to impacts from petroleum activities but which have not been given the statutory standing of marine parks or marine nature reserves. The purpose of these is to identify sensitive marine environments other

* Proposed to and endorsed by Cabinet

than Marine Parks and Marine Nature Reserves to assist in decision making for the management and maintenance of their environmental qualities.

An ESA's boundaries are generally ecological. The boundaries may be defined by a Marine Park or Marine Nature Reserve contained within it to provide sympathetic management to maintain the ecological integrity of the Marine Park or Marine Nature Reserve (see Figure 1).

3.3. Buffer

The Buffer is primarily designed to protect sensitive marine environments from oil slicks by allowing time to manage a drifting oil slick before it reaches the sensitive marine environment.

The size of the Buffer is determined by the worst case scenario for potential drift of an oil spill over the first 24 hours. This period is the most critical, especially for most North West Shelf crude oils, because most of the toxic fraction which is initially present has evaporated off or degraded to other, less toxic substances by the time 24 hours has elapsed after the spill.

The width of the Buffer is calculated as the distance an oil spill would move in 24 hours under a continuous wind of 35km/h. A 35km/h wind is held to be the critical wind speed which maximises the rate of oil drift for a given state of degradation of the spill. Up to this speed, winds increase the drift of a spill more than they contribute to its degradation. Above this speed, white-capping becomes significant. This greatly enhances mixing of the oil film with water, augments exposure of the oil to air, and leads to a three to five-fold increase in the rate of degradation of the oil. A rate of drift of oil of 3.5% of the wind speed is assumed on the basis of observations in the field. The Buffer's width can thus be calculated as: 3.5% x35km/hour x 24 hours = 29.4 km (rounded to 30km).

The Buffer often extends beyond State waters. The State will work cooperatively with the Commonwealth to ensure sensitive marine environments will remain protected. Open Waters outside Marine Parks/Marine Nature Reserves, ESAs and their Buffer retain the current protection under existing legislation and administrative procedures.

The State has very limited ability to control the movements of shipping. Hence, prevention of spills from ships is largely outside the scope of this bulletin. Nonetheless, the bulletin serves as a guide to the priority areas to be protected in the event of a spill. For example, special consideration will be required where dispersants or chemicals may be used on oil spills (Section 7).

4. Referral and environmental assessment of proposals

Environmental damage may result from more or less continuous low-level (chronic) pollutant inputs (such as from process or sewage outfalls), episodic pollutant discharge (oil and/or chemical spills, siltation), or from an increase in human recreational activities. The potential impact of any change will depend on the type of proposal and the sensitivity of the environment. A decision for the Authority to undertake an environmental assessment is based on these two factors. A summary of the Environmental Protection Authority's assessment for activities in each zone is given in Table 1. It is based on existing published positions for proposals which were formally assessed and established by the Authority in Bulletins 504, 581, 582 and 654.

Table 1. Summary of petroleum activities and assessment by EPA in sensitive marine environments

ZONE	ACTIVITY	ASSESSMENT BY EPA	COMMENTS
Marine Nature Reserve (MNR) or Marine Park (MP)	Seismic	(a) Formal (b) Informal*	Main prospect centred in and requiring access within MP or MNR. Presumption against being environmentally acceptable Main prospect is outside MP/MNR, or could be accessed from outside MP/MNR
	Exploration drilling	Formal	Presumption against drilling from wet areas but may be acceptable from dry parts of MP/MNR, or if accessible by directional drilling from outside boundary. Must show environmental impacts to be acceptably low
	Production	Formal	Presumption against environmental acceptability unless on dry part
	Pipeline	Formal	Site and proposal-specific. If no reasonable alternative outside MP/MNR and no significant impacts to sensitive elements, may be environmentally acceptable.
ESAs	Seismic	Informal* usually or not assessed	Depends on proximity to sensitive nearshore or shallow environments AND proposed energy source
	(Permit-wide) exploration drilling	Formal	Appendix D presents most likely conditions if approved. Other arrangements may apply in well studied areas of lesser environmental sensitivity (see Sect. 4.1)
	Production	Formal	Site and proposal-specific
	Pipeline	Formal	Minimise impacts to sensitive elements
Buffer	Seismic	Not assessed	Minimise potential for conflict with other users such as trawlers
	(Permit-wide) exploration drilling	Informal*/Not assessed	EPA may provide advice to DOME on specific environmental aspects
	Production	Formal	Site and proposal-specific
	Pipeline	Formal	Site and proposal-specific
Open Waters	Production/Pipeline	Formal	Only production proposals in open State waters would require referral to the EPA

* Informal with public advice

4.1 Petroleum exploration

A. Seismic surveying

Seismic survey proposals which are within Marine Parks, Marine Nature Reserves and ESAs are required to be referred but are normally not assessed unless they are located in particularly sensitive parts of the marine environment such as intertidal zones and over coral reefs. Surveys may be permitted within Marine Parks and Marine Nature Reserves where it is clear they form part of a survey which is centred on petroleum prospects which can be accessed from outside the park or reserve.

In cases where surveys are proposed in sensitive or proclaimed areas the proposals would normally require appropriate levels of supporting environmental information to be submitted to the Authority, with environmental management plans for minimising potential impacts. Such proposals would be likely to attract informal assessment with advice to the proponents from involved Government agencies.

B. Exploration Drilling.

The Environmental Protection Authority's general position on petroleum exploration proposals, which has been stated in several recent assessments (EPA Bulletins 504, 581, 582 and 654), can be summarised as:

- in sensitive marine environments, proposals need to clearly demonstrate an effective contingency plan to cope with situations that could lead to environmental impacts, especially the possibility of oil spills;
- proposals adjacent to Marine Parks and Marine Nature Reserves will be closely assessed for environmental acceptability on their merits;
- there is a presumption against the environmental acceptability of marine-based petroleum proposals in Marine Parks and Marine Nature Reserves. Access to resources in a park from land-based rigs or by directional drilling may be environmentally acceptable;
- outside sensitive marine environments exploration proposals normally could proceed, subject to demonstration of an acceptable oil spill contingency plan.

Since 1990, the formal assessment process for petroleum exploration proposals has been refined to facilitate assessment of either specific geological structures likely to be drilled, or the entire permit area (permit-wide or programme assessment), rather than one well at a time. The programme could encompass any reasonable number of wells and approval would normally be given for five years. Assessment has usually been at the level of Consultative Environmental Review (CER). Typically a staged approach is used where a permit-wide assessment is focussed on issues in generality, leading to a permit-wide approval on condition that specific environmental details are provided for each well site when these are defined later.

For a permit-wide approval the Consultative Environmental Review document is expected to describe the full spectrum of drilling and associated activities. It should define their anticipated zone of influence in the full range of environments in which they are likely to occur, and should consider the proper management of routine and accidental discharges in these areas. For the Environmental Protection Authority to be able to recommend approval the document must demonstrate that impacts can be restricted to an acceptably low level in sensitive parts of the marine environment.

For each proposed well, site-specific data (exact position, water depth, bottom conditions, distance to sensitive sites, characteristics of those sites and time taken for a spill to reach them, for example) must be submitted for review and endorsement by the Environmental Protection Authority before commencement of drilling. However, this may be later, after permit-wide approval of the proposal has been given, when exact locations have been pinpointed by seismic survey. Under unusual conditions and where areas of particularly high sensitivity are close to proposed well sites, the Authority may require a separate specific assessment. The aim is to facilitate detailed consideration of the particular proposal and environment. This requires preparation of a site-specific environmental management and oilspill contingency plan. This

plan may discuss conditions under which prior approval for the use of dispersant is considered appropriate and for which permission is sought.

The programme assessment procedure has led to savings in time and resources for proponents, involved agencies, the public and the Environmental Protection Authority while still providing for adequate environmental protection. A generic set of guidelines written to assist in the preparation of the environmental review document (in this case a CER) is included in Appendix C.

Under the new system proposed in this bulletin, all drilling proposals in Sensitive Marine Environments and the Buffer will continue to be referred to the Authority. This automatic referral is the safeguard for these areas but does not imply that proposals will automatically require formal assessment. Where the proposed activity clearly poses no significant threat to the environment (ie where the well site is a safe distance from the nearest environmentally sensitive reef, beach etc) and an acceptable oil spill contingency plan has been developed, the referral will simply function as a notification to alert the Environmental Protection Authority and the public of activities in the area. The Environmental Protection Authority would normally assess proposals within Sensitive Marine Environments. In areas of the highest sensitivity, proposals may not be considered environmentally acceptable unless it can be shown that the associated risks are small and any impacts manageable.

A critical part of the documentation that must be submitted is the Oilspill Contingency Plan. This outlines the steps to be taken in the event of an oilspill to minimise its effects on the environment. It requires the proponent to define the environmental sensitivity of the areas likely to be within the zone of potential impact from a spill and have available people and adequate supplies of equipment for containing, collecting, transporting or dispersing the spilt oil. The Oilspill Contingency Plan should detail a clearly defined sequence of actions, assigned to responsible personnel, which are to be carried out for the above operations. This plan is reviewed by the Authority, the Department of Minerals and Energy and the State Committee for Combating Marine Oil Pollution (State Combat Committee), and is required to be of an acceptable standard before approval is given for drilling.

For exploration drilling proposals in some parts of an ESA or Buffer where earlier projects have been assessed by the Environmental Protection Authority, and where the likely impacts are well understood, the Authority may consider, following referral, that further formal assessment is unnecessary, provided the proponent is willing to accept environmental approval with appropriate environmental conditions attached under the legislation of the Department of Minerals and Energy. Proposals would still need to be referred to the Authority at the outset and environmental information about the proposals and the conditions of approval would need to be readily available to the public from the Department of Minerals and Energy, the Environmental Protection Authority and the proponent. Under the Environmental Protection Act the Authority may call in any proposal at any time. Hence, a proposal to drill a well in an exceptionally sensitive area could be reviewed if warranted.

Some frequently applied environmental conditions and proponent commitments for offshore drilling programmes are provided in Appendix D. It is important to note that the conditions and the commitments are accorded the same legally binding status once the proposal is approved.

4.2 Petroleum production

All production proposals in State waters and on islands must be referred to the Authority by the Department of Minerals and Energy and will be formally assessed.

There is a presumption against the environmental acceptability of production in the waters of Marine Parks and Marine Nature Reserves.

Assessment elsewhere is on a case-by-case basis. Provided the proponent can demonstrate the proposal will not have an unacceptable environmental impact, it will be found environmentally acceptable. Characterisation of the environment and its sensitivity to potential pollutants associated with the proposal is required. Pollution could arise from oil or chemical spills, nutrient enrichment, suspended sediments, toxic wastes, habitat modification (eg from

dredging) , introduction of biological organisms such as from the discharge of ballast waters, and hot water discharges. Protection or minimisation of impacts to sensitive elements of the environment, such as seagrass beds, coral reefs, intertidal areas and mangroves, is given a high priority.

5. Possible sources of marine oil spills off Western Australia

A total of 30 spills were reported in 1993 to the Department of Marine and Harbours in Western Australia. Some were algae erroneously interpreted as oil slicks. They varied from under a litre to large enough to require cleanup action. Possible sources of oil spills are:

- **Terminal Operations:** only one refinery exists in WA, at Kwinana, 20km south of Fremantle, but tanker loading of crude oil occurs from Barrow Island, Withnell Bay, Thevenard Island, Airlie Island, Varanus Island and Broome. Unloading of refined petroleum products takes place at Fremantle, Port Hedland, Port Walcott, Dampier, and, to a lesser extent at other ports, while bunkering activities are considerable at the Port of Fremantle.

- **Marine Transport:** according to an estimate by the National Academy of Sciences[4], marine transportation, including terminal operations and bunkering, accounted for 45.2% of the total annual input of petroleum hydrocarbons to oceans around 1985. Some 48% of this resulted from tanker operations, while 27% came from tanker accidents.

  In 1990-91 about 960,593 tonnes (6.98 million barrels) of oil were carried to and from WA ports per month, of which about 53% was transported to and from Fremantle (including Kwinana)[5]. The oil varied from crude to refined, with specific gravity ranging from 1.03 to 0.66.

  The State has very limited ability to control the shipping movements. Hence, this aspect is largely outside the scope of this bulletin, except to the extent that the bulletin serves as a guide to the priority areas to be protected in the event of a spill. For example, special consideration will need to be given to where dispersants or chemicals may be used on oil spills.(Section 7 and Appendix E).

- **Oil Exploration and Production:** between 1968 (when the first Western Australian offshore well was drilled) and 30th June 1991, a total of 390 exploratory and development wells had been completed off the WA coast. During the last five years the rate of offshore drilling has increased following successes off the Pilbara coast.

Risk assessment of exploratory oil drilling operations overseas has identified three distinct categories of oil spillages[6], each with a different level of probability:

(a) minor spills up to about $20m^3$. These are the most common type of spill and arise from handling mishaps and fuel transfer operations;

(b) moderate spills, 100-$1500m^3$. Much less frequently a blowout with partially controlled loss of crude petroleum may occur, requiring one to three days to bring under control. None has occurred in WA waters; and

(c) major spills: uncontrolled blowouts may take weeks to months to plug by drilling a relief well. These are extremely rare off Australia ; only three have occurred offshore in Australian waters[6]. The only major incident happened in 1969 at the Petrel gas well off Northern Australia. Using today's technology it is unlikely that this could have occurred. There were also two lesser gas blowouts in Bass Strait in the Marlin field in 1968.

Several oil and gas developments exist in the North West Shelf area and more are proposed. Predictably with complex operations such as these, there have been minor to moderate spills, giving rise in some instances to localised environmental damage to sensitive areas nearby. The largest reported spills were from the Talisman production well which lost 20 barrels (3030

litres) and the SP4 Subsea pipeline, which lost around 3200 litres. With the latter an oil sheen was tracked for 24 hours but, due to its high rate of evaporation, was reported as having dissipated without damaging sensitive environments.

6. Organisations in WA concerned with oil spill policies

The body directly concerned in the event of an oil spill is the State Committee for Combating Marine Oil Pollution, (usually known as the State Combat Committee). This committee has no statutory authority but provides an administrative arrangement. It consists of three members: Director, Marine, from the WA Department of Marine and Harbours who acts as coordinator and chairman, the Manager, Emergency Services of the Fremantle Port Authority and the Regional Manager, Australian Maritime Safety Authority.

The Combat Committee is assisted by a Technical Advisory Committee which has eight members. Represented are the Department of Fisheries, the Department of Conservation and Land Management, the Environmental Protection Authority, Department of Minerals and Energy, the State Emergency Service, the Royal Australian Navy and the two Western Australian Regional Industry Controllers of the Petroleum Institute Environment Conservation Executive (PIECE).

Both committees thus include representatives from Government and industry groups concerned with oil spills. The two committees work closely together and meetings are held regularly. They are concerned with aspects of oil pollution from all sources including transport, processing and offshore exploration activities.

Discharge of oil into Western Australian waters from ships or from land is controlled by the Prevention of Pollution of Waters by Oil Act (1960). This State legislation mirrors Commonwealth legislation, which controls discharge of oil from Australian ships on the high seas, and is administered by the Department of Marine and Harbours, except where this occurs within the limits of proclaimed ports, where it is administered by the appropriate Port Authority.

Exploration for and exploitation of petroleum resources in marine areas off the Western Australian coast is undertaken subject to:

- the Commonwealth *Petroleum (Submerged Lands) Act 1967,*
- the Western Australian *Petroleum (Submerged Lands) Act 1982,*
- the Western Australian *Petroleum Act 1967-81* and
- the Western Australian *Petroleum Pipelines Act 1969.*

The exercise of powers and performance of functions of these Acts is by means of an administrative agreement between the Commonwealth and State Governments. Under the joint legislation the State Minister for Mines or the Director of the Petroleum Division of the Department of Minerals and Energy is nominated as the "Designated Authority" and is responsible for administering the above arrangements. The advice of the State Combat Committee is sought by the Department of Minerals and Energy on operators' oil spill contingency plans, and on any spills which may eventuate from offshore petroleum exploration activities.

The National Oil Spill Plan was established to cover oil pollution of the sea by ships. It provides for the maintenance of strategic centres around the Australian coast where anti-pollution equipment, funded by a levy on commercial shipping, is stockpiled[7]. Two of the centres are in Western Australia, at Fremantle and Port Hedland. In the event of a large oil spill the resources under this plan could also be called upon.

Port authorities have jurisdiction over spills in their ports and the resources under the National Plan are available to assist. The Australian Institute of Petroleum, in conjunction with the Australian Petroleum Exploration Association, has established a major spill response capability in Geelong.

The Marine Oil Spills Action Plan (MOSAP) of the petroleum organisation Petroleum Institute Environment Conservation Executive, covers marine oil spills which are the responsibility of the oil industry and thus includes pollution from refineries and offshore exploration and production activities[8]. The plan only comes into action on invitation when the spill is beyond the capabilities of the responsible company or clean-up authority, and in Western Australia it is executed by two Regional Industry Controllers and twelve Local Industry Controllers. It is intended that the National Plan and the Marine Oil Spills Action Plan will support each other when necessary.

7. Oilspill clean-up procedures

The Department of Minerals and Energy provides guidelines for the preparation of the company's Oilspill Contingency Plan and requires three copies of it. Information required is:

- environmental resources, including priorities for areas needing protection against oil pollution;
- oilspill action flow chart;
- the type and quantity of dispersant carried; and
- a directory of key Government and industry personnel indicating the order in which they would be informed of an oilspill.

It is recognised that most Western Australian-produced crude oil is comprised of "light" fraction, that is, made up of a mixture of less viscous petroleum compounds. Some characteristics of this type of crude oil are that it is more toxic than the "heavier" fractions, and that it tends to evaporate quickly, especially in the typically warm ambient conditions of the North West Shelf. Current data indicate that a slick of Western Australian light crude oil in the sea could be expected to have lost 70% or more of its original volume to the atmosphere after 24 hours[9]. This has implications for the type of response to a spill which is most appropriate.

As in the National Oil Spill Plan, the Environmental Protection Authority's preferred method for treatment of oilspills is to attempt containment and removal of the oil. This approach is favoured to minimise the toxic effect of the spill on marine organisms and to prevent as much as possible from escaping to the atmosphere from where it may impact on a nearby terrestrial environment. It is recognised that containment booms are effective only under favourable weather conditions, but their provision in Western Australian contingency planning is mandatory for offshore drilling activities in Sensitive Marine Environments on the grounds that:

- most spills are minor and therefore booms are an appropriate response;
- weather conditions are often suitable for their use;
- booms may be used to divert oil from specially sensitive coastal locations; and
- containment of oil by booms may facilitate successful dispersion or recovery.

The National Plan includes a list of equipment available throughout the State. The equipment is owned by various port authorities, government agencies and private companies. The Australian Institute of Petroleum has purchased spill treatment hardware which has been located in Victoria and is air transportable to anywhere in Australia within 24 hours. Access to international stockpiles can also be obtained through the National Plan.

Depending on weather conditions at the time, there may be circumstances where containment is clearly impracticable. In these situations and depending on:

(a) the position and direction of movement of the oil slick;

(b) the environmental resource at risk; and

(c) the environmental and practical feasibility of later clean-up on land;

the best decision may be to do nothing, or to apply dispersants as soon as practicable, sufficiently distant from shore, and in waters of sufficient depth to ensure considerable dilution.

It should be emphasised that, because of their inherent toxicity, use of dispersants is undesirable in shallow, highly productive environments. In Western Australia this is generally within 8km of a shoreline or in waters less than 20m deep (including any reefs or banks rising to within 20m of the sea surface). However, where it is clear that, without intervention, spilt oil will significantly impact on a particularly sensitive environment such as a mangrove community, it may be beneficial for dispersant to be used. This may apply even in relatively shallow waters, but only where the dispersed oil is likely to be less harmful than the oil alone. Decisions on whether to apply dispersants or not should be made in consultation with the Environmental Protection Authority.

It is important that only the recommended ratio of concentrate to oil be applied, thus avoiding toxic effects of excessive application, particularly when using concentrated "self-mix" dispersants. In assessing drilling operators' oilspill contingency plans, particular attention is paid to the type and quantity of dispersant carried and the methods proposed for its rapid use. As far as practicable, any dispersant equipment should be compatible for use with the National Plan dispersant. Informal discussions on dispersant stocks and methods of application have been started with port and harbour authorities. Appendix E contains a guide to the use of dispersants on floating oil in Sensitive Marine Environments, although more specific regional guides may be applied on a case-by-case basis.

In Western Australia, only dispersants which have passed the toxicity and efficiency tests of the United Kingdom Government, the United States Environmental Protection Agency or an Authority recognised by Western Australia's Environmental Protection Authority will be recommended for use in this State by the State Combat Committee. The Environmental Protection Authority recommends that the least toxic formulations capable of effectively dispersing the slick are used. Where research information exists in-house or studies are proposed, the Authority seeks to review and comment on the applicability of the dispersant or the appropriateness of the studies proposed. Guidelines for the use of dispersants may be subject to a future comprehensive review aimed at developing criteria for specific environments and oil characteristics.

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Appendix A

Links between this report and Bulletin 104

Purpose of the Report

Bulletin 104 was written with the petroleum industry specifically in mind. It provided the reaction framework for the State's oilspill contingency planning. The new bulletin retains this function by reviewing areas of particular environmental and conservation significance and the characteristics of the significant environment, so as to assist in decision making, but is not as prescriptive as before. The bulletin recognises the need to review the impacts of any industry proposal in particularly sensitive parts of the marine environment.

Resource maps and zoning

For Bulletin 104 the marine resources of Western Australia were mapped by the Department of Fisheries to define environmentally significant areas (ESAs) and to enable informed decisions to be made in the likelihood of events, such as oil spills, which could threaten the marine environment. Bulletin 104 designated ESAs either as Environmentally Sensitive Localities (ESLs), which were considered to warrant more comprehensive environmental assessment, or Special Protection Localities (SPLs) which included, but did not distinguish between, Marine Parks and Marine Nature Reserves. ESAs are now termed Sensitive Marine Environments (SMEs), into which Marine Parks, Marine Nature Reserves and ESAs are grouped in the current review. Adjustments to the boundaries of Sensitive Marine Environments have now been made in the light of increased scientific knowledge and experience, as well as to simplify the system of zoning.

Environmental assessments

For exploration wells proposed within the ESL and Immediate Protection Zone the requirements specified in Bulletin 104 were for a formal assessment at ERMP level for at least the first well. Within the SPL and surrounding Immediate Protection Zone the first well proposal required a Notice of Intent.

In the last four years as a result of the increased level of knowledge (both of the environment and of the specific impacts of exploration drilling proposals) gained from previous proposals and assessments in the same general area, exploration drilling proposals in environmentally sensitive areas have generally been formally assessed at the lower level of CER by the Authority. This recognised that ESLs and SPLs were of broadly the same environmental sensitivity for the purposes of environmental assessment and the setting of environmental conditions. The elevation of the SPL to one where formal assessment was also required for exploration drilling allowed for public input and full consideration of the potential impacts of the proposal upon the environmentally sensitive resources within this zone. Drilling proposals outside ESLs and SPLs have been treated on a case-by-case basis but generally have not been formally assessed.

The current system of referrals and assessment of exploration wells reflects the changes in terminology used in this bulletin, the increased levels of knowledge about the environment and impacts from drilling. These are set out in Section 4.1 of the report. As with Bulletin 104 proposals for petroleum production continue to be formally assessed.

Appendix B

Sensitive marine environments of Western Australia

Basis of classification, main resources and associated activities

For the purpose of this report the marine environment of Western Australia includes all coastal waters up to the limit of tidal influence. Sensitive Marine Environments are classified according to the five broad criteria outlined below, any one of which is sufficient for an area to be classified as sensitive.

These are environments of:

(I) International ecological/conservation significance

- includes internationally recognised protected areas such as World Heritage areas, Biosphere reserves, Ramsar wetlands, and areas of significance for the conservation of internationally protected species;

(N) National or state ecological/conservation significance

- includes major coral/ limestone reef, seagrass and mangrove ecosystems, as well as marine nature reserves, marine parks, aquatic reserves and may include the marine components of national parks and nature reserves.

(E) Economic significance - based on the values of the biological resources of the environment

- includes major commercial fisheries, important identified nursery areas for commercial species, mariculture leases.

(C) Cultural significance

- includes environments of major recreational and/or historical value, scenic attractiveness and areas important as subsistence Aboriginal fisheries; and

(S) Scientific and educational significance

- includes environments of major scientific significance (eg, Abrolhos Islands) and/or educational value (eg areas close to major population centres).

Localities and boundaries

The Seaward boundary of the Sensitive Marine Environments identified below are generally defined as the 20 metre isobath, unless specified otherwise. Where archipelago's are involved the Sensitive Marine Environment is defined as the waters envelope by the islands of the archipelago.

Changes to the environmentally sensitive areas listed in Bulletin 104

The following significant changes have been made to the list Environmentally Sensitive Areas in EPA Bulletin 104 (1984). These areas are now called Sensitive Marine Environments in this Bulletin.

- There is more extensive representation of Kimberley environments which were under-represented in Bulletin 104. This region includes the most extensive mangrove and intertidal environments in the State in an area featuring a complex, deeply embayed coast and, islands, archipelagos and reef systems. Tidal movements are a significant factor in the potential movement of oil spills in this region due to the combination of a macrotidal regime and a deeply embayed environment, which may result in tidal jets with the potential to move oil many kilometres during a single tidal cycle. This is not generally the case in other regions.

- Oceanic island and coral reef systems off the Kimberley coast - Adele Island, Browse Island and Scott Reef have been included as Sensitive Marine Environments.

- The 80 Mile Beach has been included. This area is now recognised as an international significant site for migratory wading birds.
- The Sensitive Marine Environments along the Pilbara coast have been revised with the deletion of the criteria identifying ports and industrial sites as sensitive environments, and through improved representation of the region's major mangrove communities. Recognition of the Rowley Shelf as a sensitive environment has been extended to include similar but more oceanic shallows of the Barrow Island Shelf extending north to the Montebello Islands.
- The continuation of the Ningaloo coral reef formation south from the southern end of the Marine Park to Red Bluff is recognised by the inclusion of this area in an extension of the Sensitive Marine Environment covering the Ningaloo Marine Park.
- The Geraldton Port area has been deleted as a result of the revised criteria.
- The coast between Seven Mile Beach north of Dongara and the Peel-Harvey Inlet is represented as a continuous area, amalgamating and extending the several small areas previously represented. The reef and regional environments along this section of coast are biologically diverse and important for the crayfishing industry, as well as recreational and educational purposes near the major populations.
- The several small nodes of recreational importance identified along the Leeuwin-Naturaliste coastline have been amalgamated to continuous representation in recognition both of the major recreational significance of this coast, and its biological significance as a transition zone between west coast and south coast marine environments.
- The coastal waters adjacent to the Fitzgerald National Park have been included in recognition of this area's international status as a Biosphere Reserve and major calving ground for the Humpback Whale.
- The area identified to protect the Recherche Archipelago has been extended to cover all the islands of the archipelago.
- Twilight Cove has been added in recognition of the significance of this sandy coast, its importance to migratory waders and as a scientific monitoring site. There is a poverty of information on the values of the marine environment in the Nullarbor Region which precludes further consideration of areas in this region.

Links with Marine Park Selection Working Group

During the revision of this document close liaison has been maintained with the Marine Park Selection Working Group, co-ordinated by the Department of Conservation and Land Management.

The task of that group is to provide scientific advice to identify areas with potential for reservation as part of a system of marine Parks and Marine Nature Reserves' representative of the environments in Western Australian State waters. The report of the Marine Parks Selection Working Group is to be released later this year for public comment.

Seasonal Sensitivities

Various biota are much more sensitive at certain times of the year than others. The table below sets out those sensitive times and the reasons, for a range of species.

SPECIES	TIME	REASON FOR SENSITIVITY
Rock lobster	15 November to 30 June 15 March to 30 June October to November November to January	Fishing season except Abrolhos Islands Fishing season Abrolhos Islands Settlement of larvae Spawning
Prawns (Western King and Brown Tiger)	Mid March to end October April to mid November August to October November to January	Shark Bay trawling season Exmouth Gulf trawling season Release of larvae Settlement of larvae in shallows, eastern parts of Shark Bay and Exmouth Gulf
Fish	October to April	Peak breeding season, becoming less seasonal in tropical waters
Corals	March/April	Spawning and settlement period
Turtles	October to March	Peak breeding period in northern WA
Dugongs	October to March	Breeding period, inshore waters
Seabird breeding	March to June	Peak breeding period, some species breed in spring
Migatory waders	September/October and March/April	Migratory species congregate on coasts, Roebuck Bay to Cape Keraudren

Sensitive marine environments

1. CAMBRIDGE GULF AREA - Comprises the waters contained in the West Arm, the Ord River and their main tributaries (Forrest River, Durack River, Pentecost River and King River) from the shoaling banks at the mouth of Cambridge Gulf to 15°45'S and from 128°00'E to 128°40'E.

   I.N.E.C.

   Includes areas designated as a Wetland of International Significance. Mangrove areas of the Ord River are enclosed within the Ord River Nature Reserve, false mouths of the Ord Nature Reserve and a potential marine park. Extensive intertidal flats, salt-water crocodile population, subsistence Aboriginal fishing.

2. NORTH WEST KIMBERLEY COAST AND ISLANDS - CAPE RULHEIRES TO CAPE LEVEQUE

2(a) CAPE LONDONDERRY AREA - Cape Rulheires to Cape Bougainville via Lesueur, Stewart and Troughton Islands.

N.E.C.

Adjacent to and partly enclosed within boundaries of proposed 'A' Class national park (System 7 Report). Islands and embayments, mangroves, seagrass, salt water crocodiles, Aboriginal subsistence fishing.

2(b) ADMIRALTY GULF AND LONG REEF - Cape Bouganville to Cape Voltaire

N.C.

Adjacent to and partly enclosed within boundaries of proposed national park and island nature reserves (System 7) and potential marine park. Long Reef is a large offshore coral/algal reef platform. Important bird habitat, including mangrove birds, Salt water crocodiles. Aboriginal subsistence fishing and increasing tourism use.

2(c) CAPE VOLTAIRE TO KURI BAY/CHAMPAGNE ISLAND - including the Bonaparte Archipelago

I.N.E.C.S.

Adjacent to and includes part of Prince Regent River Biosphere Reserve, potential marine parks and proposed Bonaparte Islands Nature Reserves (System 7). Macrotidal environment supporting extensive mangrove and intertidal communities and fringing coral reefs on islands. Large protected salt-water crocodile populations, deeply enclosed embayments and pristine island/reef environments, increasing tourist use, commercial pearl culture.

2(d) KURI BAY TO KOOLAN ISLAND - Champagne Island to Conway Island

N.E.C.S.

Macrotidal environment supporting extensive mangrove communities, coral and algal reefs (Montgomery Islands), and extensive intertidal mud flat environments. Dugong and salt-water crocodile populations, deeply enclosed embayments and pristine island/reef environments, increasing tourist use, commercial pearl culture. Adjacent to and includes parts of the proposed Walcott Inlet National Park. Proposed aquatic reserve - System 7 (potential marine park).

2(e) BUCCANEER ARCHIPELAGO - Koolan Island to Cape Leveque and King Sound, includes the Fitzroy River downstream from Langey Crossing.

N.E.C.

Macrotidal system supporting extensive island and intertidal reef systems, mangrove and mud flat communities. Commercial pearl culture, Aboriginal commercial trochus and subsistence fishing. Islands of the Buccaneer Archipelago are proposed conservation reserves and potential marine park.

3. BROWSE ISLAND AND SURROUNDING REEFS - approximately 360 km north of Derby

N.

Nature reserve to Low Water Mark, an important green turtle nesting area.

4. SANDY ISLET-SCOTT REEF - Approximately 400 km north-west of Derby (Sandy Islet is State waters, Scott Reefs, North and South are in Commonwealth Waters).

N.

Coral cay in a pristine environment. Atypical shelf atolls, rich diversity of marine life. Turtle nesting site (Sandy Islet).

5. ADELE ISLAND AND SURROUNDING REEFS - Approximately 200 km north-north-west of Derby.

N.

Proposed nature reserve, important sea-bird nesting colonies, significant coral reef.

6. CAPE LEVEQUE TO LOW SANDY POINT - Thomas Bay, Pender Bay and Beagle Bay.

N.C.

Mangrove communities and extensive tidal flats. Proposed Cape Borda Nature Reserve. Subsistence Aboriginal fishing, commercial pearl culture.

7. LACEPEDE ISLANDS AND IMMEDIATE SURROUNDING REEFS

N.

Nature reserve (System 7). Green turtle nesting area. Giant clams. Rich variety of corals. Important sea bird nesting area. Type locality for some coral species.

8. ROWLEY SHOALS (Mermaid, Clerke, Imperieuse Reefs) - approximately 300 km west of Broome.

I.N.C.S.

Clerke and Imperieuse Reefs are a Marine Park, Mermaid Reef is a National Nature Reserve. Bedwell Island, within Clerke Reef, is a breeding area for the Red-tailed Tropic Bird, an endangered species. Spectacular coral reefs in a pristine environment. Atypical shelf atolls, biologically and geomorphologically unique in WA. Huge diversity of tropical marine fauna including rare species and new genera of corals and fish. WA Museum study area. Increasingly important recreational diving area.

9. BROOME AND ROEBUCK BAY- STATION HILL TO CAPE VILLARET

9(a) BROOME - Station Hill to Entrance Point

N.C.S.

Tourism. Subsistence Aboriginal fishing. Broome beaches and boating areas. Aquatic reserve to protect rare shells. Intertidal reefs, important palaeontological site for dinosaur footprints.

9(b) ROEBUCK BAY - Via a straight line connecting Entrance Point to Cape Villaret

I.N.E.C.

Includes a declared Ramsar wetland of international significance as migrant wading bird habitat. Potential marine park. Commercial pearl culture. Tourism. Subsistence Aboriginal fishing. Boating and yachting. Sport fishing.

10. CAPE VILLARET OFFSHORE AREA - An area opposite Cape Villaret 122°00'37"E to 122°03'53"E by 18°17'08"S to 18°18'52"S.

E.

Commercial pearl culture.

11. LAGRANGE BAY - Cape Latouche Treville to Cape Bossut.

N.C.

Migrant wading bird habitat. Subsistence Aboriginal fishing. Potential marine park.

12. CAPE MISSIESSY AREA - An area opposite Cape Missiessy 121°10'E and 19°00'S, 121°30'E and 19°00'S, 121°00'E and 19°20'S, 121°20'E and 19°20'S.

E.

Major area for collection of pearl oysters for culture and for Mother of Pearl.

13. EIGHTY MILE BEACH AND CAPE KERAUDREN- Cape Missiessy to Point Poolingerina and extending to 5km seaward of Low Water Mark.

I.N.C.

Declared Ramsar wetland of international significance as migratory wading bird habitat. Regional recreation and sport fishing.

14. BEDOUT ISLAND

N.

'A' Class nature reserve. Important seabird nesting area.

15 . BREAKER INLET - Poissonnier Point to Spit Point and down Breaker Inlet to 20°03's, and extending 5km seaward of Low Water Mark.

N.C.

Mangroves, important seabird feeding areas. Subsistence Aboriginal fishing.

16. NORTH TURTLE ISLAND AND SURROUNDING REEFS

N.

'A' Class nature reserve. Important seabird nesting area.

17. LITTLE TURTLE ISLAND AND SURROUNDING REEFS

N.

'A' class nature reserve

18. PORT HEDLAND WEST - Western edge of Finucane Island west to Cape Thouin, extending 5km seaward of Low Water Mark.

N.C

Mangroves. Boating. Subsistence Aboriginal fishing. Sport fishing.

19. CAPE COSSIGNY TO POINT SAMSON - Coast from Cape Cossigny west to Point Samson, extending 5km seaward of Low Water Mark.

N.E.C.

Significant mangrove communities. Fishing boat harbour (Sam's Creek). Subsistence Aboriginal fishing. Sport fishing. Boating. Recreational beach.

20. NICKOL BAY FORESHORE — extending 5km seaward of Low Water Mark.

N.C.

Mangroves. Sport fishing. Recreation.

21. DAMPIER ARCHIPELAGO TO NORTH-WEST CAPE - COAST AND ISLANDS

21(a) DAMPIER ARCHIPELAGO - Boundary to include West Intercourse Island, Eaglehawk Island, Enderby Island, Kendrew Island, Brigadier Island, Legendre Island Delembre Island , Dolphin Island and the eastern coastline of the Burrup Peninsula.

I.N.E.C.S.

Dugongs. Islands are mostly nature reserves proposed as national park and the waters potentially a marine park/s. Significant environments include sand flats supporting rich intertidal fauna, turtle and seabird nesting areas, coral reefs, mangroves. Economic significance includes commercial pearl culturing, solar salt intake at Dampier, and industrial cooling water intakes. A number of islands important for recreation; boating and yachting, beaches and sport fishing.

21(b) MONTEBELLO ISLANDS, LOWENDAL ISLANDS AND BARROW ISLAND SHELF - Extending to the 20 metre isobath.

N.E.C

Montebello Islands are 'A' Class conservation park, Barrow Island and the Lowendal Islands are Class 'A' nature reserves. A marine park is proposed for the Montebello Islands area. Important turtle breeding area. Diverse molluscan fauna. Coral reefs, mangroves, intertidal flats, extensive sheltered lagoonal waters, and shallow algal and seagrass reef platform extending to the south of the Montebello Islands to the Rowley Shelf. Commercial pearl culture, increasing recreational importance.

21(c) ROWLEY SHELF - To encompass an area bounded by Ningaloo Marine Park boundary at 114°16'E, 21°43'S and 114°19'E, 21°47'S, Tubridgi Point, the 20m isobath and the mainland east to the Dampier Archipelago, and to include all islands within this area.

I.N.E.C.

Dugongs near Port Weld. Little Rocky Island, part of Thevenard Island and Serrurier Island are 'A' class nature reserves. Reservation of the other islands as nature reserves is progressing (System 9). Seabird nesting areas. Coral reefs. Turtle breeding areas. Mangrove and tidal flats. Source of nutrients for surrounding ecosystems. Fish and prawn nursery area. Commercial prawn fishing. Commercial pearl culture off Middle Island. Subsistence Aboriginal fishing in Beadon Bay. Offshore fishing. Recreation.

21(d) EXMOUTH GULF- Waters of the Gulf enclosed by a line from Ningaloo Marine Park boundary at 114°19'E, 21°47'S to Tubridgi Point.

I.N.E.C.

Dugongs. Islands are proposed nature reserves (System 9). Rich echinoderm fauna. Extensive mangrove and tidal flats. Seabird feeding areas. Turtle nesting area. Commercial prawn and fin fishery. Commercial pearl culture in Giralia Bay and Gales Bay. Fish and prawn nursery area. Tourism. Sport fishing. WA Museum research areas.

22. NINGALOO MARINE PARK AND CORAL REEF SYSTEM SOUTH TO RED BLUFF- From Red Bluff at 24°02'S, around North West Cape to enclose Bundegi Reef in Exmouth Gulf at 21°53'S.

I.N.E.C.S.

Marine Park. Important large, rich, accessible barrier coral reefs with associated flora and fauna, clear sheltered lagoonal waters, sandy beaches and rocky headlands. Mangroves. Turtle breeding areas. Tourism. Recreation. Sport fishing. Coral Bay marine reserve. Biological research area.

23. SHARK BAY WORLD HERITAGE AREA AND SHARK BAY MARINE PARK/HAMELIN POOL MARINE NATURE RESERVES - Bounded by a line drawn between Point Quobba and Zuytdorp Point at 26°25'S, via Bernier, Dorre and Dirk Hartog Islands and including the near coastal waters to the west of these islands to the 20 metre isobath.

I.N.E.C.S.

World Heritage Listed Area. Stromatolites. Large dugong population, world's largest seagrass bank. Wooramel Seagrass Bank, Denham Sound, Freycinet Reach and Estuary. Hopeless Reach and Lharidon Bight are included in the Shark Bay Marine Park, Hamelin Pool is a Marine Nature Reserve. Turtle breeding areas. Seabird nesting areas. Seagrass meadows. Mangroves. Tidal flats. Commercial prawn and fin fishery (mainly snapper). Scallops. Fish and prawn nursery area. Intakes for commercial solar salt production at Useless Inlet and Useless Loop. Tourism. Sport fishing. Boating. Shell collecting. Geological/biological research areas.

24. KALBARRI - Murchison River Estuary.

E.C.

Commercial fishing, including rock lobster fishery. Tourism. Major recreational area. Sport fishing.

25. HOUTMAN-ABROLHOS ISLANDS AND ASSOCIATED CORAL REEFS (Wallabi, Easter and Pelsart groups).

I.N.E.C.S.

Breeding islands for Lesser Noddy, an endangered bird species. The islands are an 'A' Class reserve for conservation of flora and fauna, tourism and for purposes associated with the fishing Industry. Marine parks are proposed for some areas. Rich and diverse marine flora and fauna. Important seabird nesting areas. Southernmost coral reef system in the Indian Ocean. Mangroves. Algae. Sea lions. Major rock lobster fishery. Scallop fishery. Recreation. Sport fishing. Biological research area.

26. CENTRAL WEST COAST LIMESTONE REEF AND LAGOON ENVIRONMENTS - SEVEN MILE BEACH TO PORT KENNEDY

26(a) Seven Mile Beach to Two Rocks on the mainland extending to the 20m isobath and including all islands and reefs.

N.E.C.S

Island nature reserves, biologically rich reef and semi-enclosed lagoonal waters. Seabird nesting areas. Sea lions. Rock lobster fishery. Recreation. Sport fishing. Seven Mile Beach is an important biological research and reference area.

26(b) METROPOLITAN BEACHES AND REEFS- Two Rocks to Woodman Point, extending to the 20 metre isobath.

N.E.C.S.

Marmion Marine Park, offshore reefs and lagoons from Ocean Reef to Trigg (System 6). Rock lobster fishery. Sport fishing. Recreational beaches. Tourism. Boating and yachting.

26(c) ROTTNEST ISLAND AND ASSOCIATED REEFS

N.E.C.S.

'A' Class reserve. Includes adjacent rocks and islands and adjacent waters to 20 metre isobath. Two proposed aquatic reserves (System 6). Rich and varied marine flora and fauna, including coral species. Seabird nesting areas. Professional fishery, mainly rock lobster. Tourism. Recreational beaches. Boating. Sport fishing. Abalone. Biological research and educational area.

26(d) SWAN AND CANNING RIVER ESTUARIES - River mouth to Guildford and Nicholson Rd Bridge.

N.E.C.

Major west-coast estuary, fish nursery area. Includes several marine parks. Tourism, very high recreational usage. Boating and yachting. Sport fishing.

26(e) COCKBURN SOUND - Waters enclosed by Woodman Point, Carnac Island, Garden Island and Point Peron.

N.E.C.S.

Proposed aquatic reserve surrounding Carnac Is. (System 6). Seagrass, major fish nursery area. Professional fisheries (principally pilchard, scaly mackerel, crabs and abalone) and mariculture. Power station and industrial water intakes. Tourism. Sport fishing. High recreational use. Beaches. Boating and yachting. Biological research area.

26(f) SHOALWATER BAY AND WARNBRO SOUND - Point Peron to Becher Point, including Penguin Island.

N.E.C.

Shoalwater Bay Marine Park. Sea lions. Nesting area for Little Penguin. Seagrass Nursery area for fish. Professional abalone fishery. Beach recreation. Boating and yachting. Sport fishing.

27. PEEL-HARVEY INLET- Includes entrance to Peel Inlet, Mandurah and the Dawsville Channel (when completed).

I.N.E.C.

Designated Ramsar Wetland of International significance. Includes proposed marine park. Commercial fishery. Fish nursery. Tourism. Recreation. Sport fishing.

28. LESCHENAULT INLET

N.E.C.

Isolated southernmost mangrove populations in WA. Professional fishery. Power station cooling water intake. Tourism. Recreational beaches. Boating and yachting. Sport fishing.

29. GEOGRAPHE BAY - To 20m isobath, from Wonnerup Estuary to Cape Naturaliste.

E.C.

Professional fishery. Fish nursery area. Seagrass. Tourism. Beaches. Sport fishing. Boating and yachting.

30. LEEUWIN-NATURALISTE COAST - Cape Naturaliste to Cape Leeuwin, extending to the 20 metre isobath.

    N.C.

    High energy coastal environment, reefs, scattered corals, important seabird nesting areas, sealions. Biologically significant transitional environments between the relatively warmer waters of the west coast and the cooler waters of the south coast. Major recreational significance for sport fishing, beaches, surfing, diving

31. BLACKWOOD RIVER ESTUARY

    E.C.

    Major river estuary. Tourism. Recreation. Beaches. Sport fishing. Fish nursery area .

32. WINDY HARBOUR.

    N.C.

    Part of D'Entrecasteaux National Park. Recreational beaches. Sport fishing.

33. BROKE INLET.

    N.C.

    Proposed aquatic reserve (System 2), surrounded by D'Entrecasteaux National Park. Only estuary in the South-West essentially unmodified by changes associated with land-clearing and development. Fish nursery area. Broke Inlet is only open to the sea during the winter -spring season.

34. NORNALUP INLET.

    N.C.

    Surrounded by the Walpole-Nornalup National Park. Fish nursery and fishing area. Recreational area.

35. IRWIN INLET AND PEACEFUL BAY (Foul Bay).

    R.

    Recreational beaches. Sport fishing.

36. WILSON INLET - Includes Ocean Beach.

    E.C.

    Fish nursery and fishing area. Tourism. Recreational beach. Sport fishing.

37. KING GEORGE SOUND, ALBANY - Bald Head to Cape Vancouver. Includes Princess Royal Harbour, Oyster Harbour and King George Sound.

    N.E.C.S.

    Important seabird nesting areas. Seals. Diverse molluscan fauna. Seagrass meadows. Professional fishery (principally pilchard). Tourism. Recreational beaches. Boating and yachting. Sport fishing. Research areas.

38. TWO PEOPLE BAY - Cape Vancouver to Bald Island, includes islands.

    N.R.

    Class A Nature Reserve. Recreational beaches. Sport fishing.

39. HASSELL BEACH (Cheyne Beach) - Lookout Point to coast at 118°30'E.

    E.C.

    Salmon fishery. Recreational beach.

40. BEAUFORT INLET.

    E.C.

    Fish nursery and fishing area. Recreational beaches.

41. BREMER BAY - Smooth Rocks to Gordon Inlet.

    C.

    Recreational beaches. Sport fishing.

42. FITZGERALD RIVER NATIONAL PARK COASTLINE - Gordon inlet to Culham Inlet.

    I.N.C.

    Reefs and Seagrass meadows. Significant humpback whale calving grounds. Coast is part of Fitzgerald River Biosphere Reserve. Recreational beaches. Sport Fishing.

43. HOPETOUN.- Culham Inlet to Table Hill

    C.

    Recreational beaches. Sport fishing.

44. THE RECHERCHE ARCHIPELAGO AND ESPERANCE - Boundary defined by coastline and islands of the Recherche Archipelago, between Stokes Inlet and Israelite Bay.

    N.E.C.

    Islands of Archipelago have 'A' Class nature reserve status. Includes Cape Le Grand National Park and Cape Arid National Park which extend to low water mark. Important seabird nesting areas. Seals (especially New Zealand Fur Seal). Diverse molluscan fauna. Scattered corals. Professional fisheries (mainly tuna, shark and abalone). Tourism. Recreational beaches. Boating and yachting. Sport fishing.

45. TWILIGHT COVE - Coastline from 125° 50'E to 126° 25'E.

    N.S.

    Fragile sandy coast, fringing reef and lagoon environment, seagrass meadows significant wader-bird habitat. Scientific research area and monitoring site.*

* Note there is little documented information on the characteristics or significance of the marine environment adjacent to the Baxter Cliffs or the Roe Plains sections of the Nullarbor coast east to the border with South Australia. The characteristics of this coastline need to be further investigated to determine their level of significance.

° Systems 2, 5, 6, 7, 8, 9 - refer to References 10, 11,12 and 13.

Appendix C

Generic guidelines for the preparation of a Consultative Environmental Review for a proposed offshore petroleum exploration drilling programme

Overview

In Western Australia all environmental reviews are concerned with protecting the environment. The fundamental requirement is for the proponent to describe what will be done, to discuss the potential environmental impacts of the proposal, and then to describe how those environmental impacts are going to be managed so that the environment is protected.

If the proponent can demonstrate that the environment will be protected then the proposal will be found environmentally acceptable; if the proponent cannot show that the environment would be protected then the Environmental Protection Authority (EPA) would recommend against the proposal.

Throughout the process it is the aim of the EPA to advise and assist the proponent to improve or modify the proposal in such a way that the environment is protected. Nonetheless, the environmental review in Western Australia is proponent-driven, and it is up to the proponent to identify the potential environmental impacts, and design and implement proposals which protect the environment.

Protecting the environment means that the natural and appropriate social values associated with the project area are protected. Where they cannot be protected, proposals to mitigate the impacts are required.

These Guidelines identify issues associated with the exploration program that should be addressed within the Consultative Environmental Review (CER). They are not intended to be exhaustive and the proponent may consider that other issues should also be included in the document.

The CER is intended to be a brief document, its purpose should be explained, and the contents should be concise and accurate, as well as being readily understood by interested members of the public. Specialist information and technical description should be included where it assists in the understanding of the proposal. It may be appropriate to include ancillary or lengthy information in technical appendices.

Key issues

The important issues for this proposal are likely to be associated with the location of the drill rig close to environmentally sensitive areas such as (for example) coral reefs, seagrass beds, turtle and bird nesting beaches, mangroves and marine nursery areas. Routine and accidental discharges and their impacts on the environment need to be considered. The key issues for the project should be clearly identified and the content of succeeding sections determined by their relevance to these issues. The key issues are expected to include:

- an appraisal of the environment within the area covered by the proposal. This should also cover the social environment if, for example, commercial/recreational industries exist within the area;
- broad timing of the proposal. The specific timing of the wells would not be required at this stage as this information would be expected to comprise part of the site-specific data package provided to Government at the time the well sites become accurately known;
- operational details of the programme. These should include rig type, rig refuelling procedures, exclusion zones, drilling muds, routine discharges (domestic and drilling), support personnel, vessels and their bases;
- description of any sensitive environments;
- discussion of the probability and impacts of oilspills (small, medium and large), their grade, trajectories, the time taken to spread into environmentally sensitive areas if uncontrolled, and proposed management of each category of spill. It will be important to acknowledge the probability of drilling occurring near to sensitive marine environments (even if specific well sites are not known at this stage), and to prepare an appropriate management plan to minimise the risks of a spill and its impact should it occur;

- the purpose of the plan should be to demonstrate the manner in which potential environmental impacts (via routine or accidental activities) can be ameliorated either by design or specific ongoing management. It should also discuss proposed environmental monitoring of any sensitive locations adjacent to proposed well sites, both before and after drilling;
- an Oilspill Contingency Plan, which should be in the form of a stand-alone Appendix provided with the CER. The key points from this plan should be summarised in the management plan within the body of the CER and should include a discussion of the specifications and location of the proposed containment and recovery equipment (booms, skimmers, dispersants); and
- any other key issues raised during the preparation of the report.

Public participation and consultation

A description should be provided of the public participation and consultation activities undertaken by the proponent in preparing the CER (such as discussions with the Shire and local communities). This section should describe the activities undertaken, the dates, the groups and individuals involved and the objectives of the activities. It should be cross referenced to other sections and should clearly indicate how community concerns have been addressed. Where these concerns are dealt with via other departments or procedures outside the Environmental Protection Authority process, these can be noted and referenced here. Provisions for notifying the public when exploration activities will actually occur need also to be considered.

Detailed list of environmental commitments

The commitments being made by the proponent to protect the environment should be clearly defined and separately listed. Where an environmental problem has the potential to occur, there should be a commitment to rectify it. They should be numbered and take the form of:

- **who** will do the work?;
- **what** and **where** is the work?;
- **when** and to **whose satisfaction** will the work be carried out?

All actionable and auditable commitments made in the body of the document should be numbered and summarised in this list.

Appendix D

Typical environmental conditions for offshore petroleum exploration drilling proposals within environmentally significant areas

EXAMPLE ONLY

STATEMENT THAT A PROPOSAL MAY BE IMPLEMENTED (PURSUANT TO THE PROVISIONS OF THE ENVIRONMENTAL PROTECTION ACT 1986)

EXPLORATION DRILLING IN PERMIT EP ....

This proposal may be implemented subject to the following conditions:

1 Proponent Commitments

The proponent has made a number of environmental management commitments in order to protect the environment.

1-1 In implementing the proposal, the proponent shall fulfil the commitments (which are not inconsistent with the conditions or procedures contained in this statement) made in the Consultative Environmental Review and in response to issues raised following public submissions. These commitments are consolidated in Environmental Protection Authority Bulletin - - - as Appendix 1. (A copy of the commitments is attached.)

2 Implementation

Changes to the proposal which are not substantial may be carried out with the approval of the Minister for the Environment.

2-1 Subject to these conditions, the manner of detailed implementation of the proposal shall conform in substance with that set out in any designs, specifications, plans or other technical material submitted by the proponent to the Environmental Protection Authority with the proposal. Where, in the course of that detailed implementation, the proponent seeks to change those designs, specifications, plans or other technical material in any way that the Minister for the Environment determines on the advice of the Environmental Protection Authority, is not substantial, those changes may be effected.

3 Site Specific Data

The Environmental Protection Authority requires site-specific environmental data for each proposed well site to enable review of environmental management plans for adequate protection of the area.

3-1 At least three weeks prior to the commencement of drilling of exploration wells proposed as part of the programme described in the Consultative Environmental Review, the proponent shall provide details of the exact locations of the wells and descriptions of the adjacent environment together with any proposed site-specific modifications to environmental management provisions for those locations, to the requirements of the Environmental Protection Authority on advice of the Department of Minerals and Energy.

3-2 The proponent shall subsequently implement the proposals referred to in condition 3-1 to the requirements of the Environmental Protection Authority on advice of the Department of Minerals and Energy.

4 Type of Drill Rig

The Environmental Protection Authority's assessment is based on the premise that the proponent will use a jack-up drill rig. The impacts associated with different types of drill equipment may vary and may require separate management procedures to be in place for their use.

4-1 Prior to the use of any drilling rig other than a jack-up type, the proponent shall provide plans for its use and environmental management to the Environmental Protection Authority for evaluation and shall subsequently implement appropriate environmental management plans for that rig, to the requirements of the Environmental Protection Authority on advice of the Department of Minerals and Energy.

5 Work Programmes beyond Current Proposal

Proposals for work other than the drilling proposed will require further review because of the potential for environmental impacts which have not been assessed.

5-1 Prior to implementing any drilling beyond that in the programme proposed in the Consultative Environmental Review, or development plans resulting from that programme, the proponent shall refer proposals for such further work to the Environmental Protection Authority and the Department of Minerals and Energy.

6 Responsibility for Adverse Environmental Impacts

Recognition is needed of the environmental sensitivity of the area and a commitment to make good any environmental damage which might be incurred as a result of the proposal going ahead.

6-1 Prior to drilling the first well, the proponent shall implement arrangements to accept responsibility for any adverse environmental impacts which may occur as a consequence of the proposal proceeding, to the requirements of the Minister for the Environment after consultation with the Minister for Fisheries and the Minister for Mines.

7 Oil Spill Response Capability

The proponent needs to be able to manage small oilspills which may occur in the vicinity of the drill rig.

7-1 Prior to drilling each well, the proponent shall provide on or adjacent to the rig the capability for containing small oil spillages, to remain there permanently until demobilisation of the rig, to the requirements of the Environmental Protection Authority on advice of the Department of Minerals and Energy.

8 Refuelling of the Rig

To maximise the chances of containment and recovery of spilt oil, the refuelling operation should take place in favourable conditions.

8-1 The proponent shall only refuel the rig when weather and sea conditions are sufficiently calm to permit containment and recovery of any fuel oil which may be spilt, to the requirements of the Environmental Protection Authority on advice of the Department of Minerals and Energy.

9 Simulated Oil Spill Exercise

The proponent should ensure oilspill preparedness by testing the Oilspill Contingency Plan on a regular basis.

9-1 Prior to commencement of the first well, the proponent shall successfully trial run an oil spill exercise, up to the point of the deployment of resources, to the requirements of the Environmental Protection Authority on advice of the State Committee for Combating Marine Oil Pollution.

9-2 The proponent shall run further oil spill exercises at least once a year or for each change of rig, whichever is the sooner, for the duration of the programme in the Consultative Environmental Review, to the requirements of the Environmental Protection Authority on advice of the Department of Minerals and Energy.

10 Decommissioning

The satisfactory decommissioning of the project, removal of the plant and installations and rehabilitation of the site and its environs is the responsibility of the proponent.

10-1 The proponent shall be responsible for environmental aspects of decommissioning the rig and any wells and rehabilitating the site and its environs, to the requirements of the Environmental Protection Authority on advice of the Director, Petroleum Division, Department of Minerals and Energy.

11 Proponent

These conditions legally apply to the nominated proponent.

11-1 No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

12 Time Limit on Approval

The environmental approval for the proposal is limited.

12-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced. Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority.)

13 Compliance Auditing

In order to ensure that environmental conditions and commitments are met, an audit system is required.

13-1 The proponent shall prepare periodic "Progress and Compliance Reports", to help verify the environmental performance of this project, in consultation with the Environmental Protection Authority.

Procedure

The Environmental Protection Authority is responsible for verifying compliance with the conditions contained in this statement, with the exception of conditions stating that the proponent shall meet the requirements of either the Minister for the Environment or any other government agency.

If the Environmental Protection Authority, other government agency or proponent is in dispute concerning compliance with the conditions contained in this statement, that dispute will be determined by the Minister for the Environment.

EXAMPLE ONLY

Commitments

The Proponent undertakes to abide by all of the commitments made in the Consultative Environmental Review (CER) for the five year exploration drilling programme for permit areas EP and in all cases will fulfil those commitments to the satisfaction of the appropriate statutory authority(s).

The major commitments given within the CER are listed below.

(1) The Proponent will adopt the environmental management strategies outlined in this CER.

(2) Well-specific details including the location, water depths, distance from sensitive resources and drilling programmes will be submitted the Department of Minerals and Energy and the EPA with each drilling application. Each application will be submitted at least three weeks prior to the proposed spud date for each well.

(3) Before commencement of their duties, each worker or contractor (including workboat and supply vessel crews) will be given an induction including advice on the sensitive nature of the environment in which the drilling rig is located.

(4) Regular crew transfers between the drilling rig and Onslow will use crew boats.

(5) Masters of crew and supply vessels will be instructed not to allow crew to disturb islands or wreck sites, nor to anchor close to coral reefs.

(6) Deck drainage and other oily wastes will be collected and transported to the mainland for disposal at a site approved by the Shire of Ashburton.

(7) The Proponent will manage all oil spills using the approved Oil Spill Contingency Plan (OSCP) and will abide by all procedures detailed in the OSCP.

(8) An oil spill recovery vessel fitted with oil spill combat equipment will be on dedicated standby at Dampier during drilling. A standby vessel will be in the vicinity of the drilling rig at all times to assist with oil spill combat responses in the event of an oil spill.

(9) An oil spill containment boom and skimmer will be stored on board the drilling rig for the duration of the drilling programme. In the event of an oil spill, this equipment will be loaded onto the support vessel for deployment.

(10) In the event that the EPA grants pre-approval to the Proponent for dispersant use, the company will ensure that adequate stocks of an appropriate approved dispersant are stored on board the drilling rig, ready for immediate use under approved conditions.

Appendix E

Use of dispersants on floating oil in sensitive marine environments

So as to reflect current improved levels of understanding this section has been revised and differs in parts from its equivalent in Bulletin 104. In that document the use of dispersant was largely prescribed by the two categories of buffer zone: in the 8km wide IPZ the use of dispersants was discouraged (proximity to shorelines and generally shallow waters), whereas their use was encouraged in the SCZ, unless within 8km of a shoreline or in waters less than 10m deep. In recognition of the fact that there is often abundant benthic life in waters up to 15m deep, the normal cutoff for dispersant use has now been set at 20m to allow a factor of safety. The Environmental Protection Authority's current position is as follows.

A. Within Sensitive Marine Environments and their Buffers:

dispersants are not to be applied unless specifically authorised by the State Combat Committee. In certain circumstances however, where drilling is close to a particularly sensitive environment, prior approval to apply dispersant under specific conditions and in accordance with a detailed contingency plan may be given, following environmental impact assessment.

B. In waters less than 20m deep (together with an 8km wide protective zone around such shallow areas) and including any reefs or banks rising to within 20m of the sea surface:

dispersants are not to be applied unless authorised by the Responsible Authority and approved by the State Combat Committee.

C. Within 8-30km from the 20m depth contour:

dispersants will be applied if considered by the Environmental Protection Authority to be necessary for the protection of the resources at risk.

D. Within 30-50km from the 20m depth contour:

dispersants are unlikely to be required. The use of dispersants will only be considered by the EPA if there are indications that the oil will move into an environmentally sensitive area.

E. For oil floating more than 50km from the 20m depth contour:

dispersants should not be needed unless recommended by the State Combat Committee after it has taken into account meteorological, hydrological and environmental advice.

Whilst the above general procedures are recommended it should be recognised that specific procedures may be applied on a case by case basis as appropriate.