



Part A

**Environmental protection
and land use planning
in Western Australia**

Part B

Biophysical factors

Part C

Pollution management

Part D

Social surroundings

Environmental Guidance for Planning and Development

May 2008

Guidance Statement No. 33

Foreword

The Environmental Protection Authority (EPA) is an independent statutory authority and is the key provider of independent environmental advice to Government.

The EPA's objectives are to protect the environment and to prevent, control and abate pollution and environmental harm. The EPA aims to achieve some of this through the development of environmental protection guidance statements for the environmental impact assessment (EIA) of proposals.

This document is one in a series being issued by the EPA to assist proponents, consultants and the public generally to gain additional information about the EPA's thinking in relation to aspects of the EIA process. The series provides the basis for EPA's evaluation of, and advice on, proposals under S38 and S48A of the *Environmental Protection Act 1986* (EP Act) subject to EIA.

The guidance statements are one part of assisting proponents, decision-making authorities and others in achieving environmentally acceptable outcomes. Consistent with the notion of continuous environmental improvement and adaptive environmental management, the EPA expects proponents to take all reasonable and practicable measures to protect the environment and to view the requirements of this Guidance as representing the minimum standards necessary.

The main purposes of this EPA guidance statement are:

- to provide information and advice to assist participants in land use planning and development processes to protect, conserve and enhance the environment
- to describe the processes the EPA may apply under the EP Act to land use planning and development in Western Australia, and in particular to describe the environmental impact assessment (EIA) process applied by the EPA to schemes.

This guidance statement has the status '**Final**' which means that it has been reviewed by key stakeholders and the public. The EPA has signed off the guidance Statement and published it although it will be updated regularly as relevant information comes to hand.

I am pleased to release this document, which now supersedes the draft version.

A handwritten signature in black ink, appearing to read 'P. Vogel', written over a horizontal line.

Dr Paul Vogel
CHAIRMAN
Environmental Protection Authority

May 2008

Using this Guidance Statement

Purpose of this Guidance Statement

- 1 To provide an overview of environmental protection processes and information, to assist land use planning and development in Western Australia.
- 2 To describe referral and environmental impact assessment processes under Part IV of the *Environmental Protection Act 1986* and, in particular, the procedures applied to schemes.
- 3 To provide the EPA's advice on a range of environmental factors in order to assist participants in land use planning and development to protect, conserve and enhance the environment.

The document consists of Parts A – E and provides the following information:

Part A – an overview on environmental protection processes in Western Australia and, in particular, the referral and environmental impact assessment procedures that apply to land use planning and development under the *Environmental Protection Act 1986*.

Part B – the EPA's advice on protecting a range of biophysical factors, to assist land use planning.

Part C – the EPA's advice on managing potential pollutants, waste and water (pollution management factors), to assist land use planning.

Part D – the EPA's advice on protecting aspects of the biophysical environment of cultural and social significance to the community (social surroundings factors), and the EPA's position on risk.

Part E – the combined sources of information and references for all chapters.

The chapters on each environmental factor in Parts B, C and D typically address the following:

1. The significance of the factor and key definitions.
2. The EPA's key principles for the protection of the factor including EPA's objectives, EPA's published position and areas of high conservation significance.
3. Considerations relevant to broad scale planning and to local area planning, including management measures.
4. Referral to the EPA – procedures and information that assist the EPA to decide whether to assess a scheme or proposal.

Supplementary information is given in Attachments at the end of some chapters.

Terms used

In this guidance statement, terms that have a special meaning under the *Environmental Protection Act 1986* are generally used in the same way as defined in the Act. These words include **scheme**, **assessed scheme**, **proposal**, **significant proposal**, **decision-making authority** and **responsible authority**.

Thus, in this guidance statement, scheme usually means a town planning scheme, a region scheme, a redevelopment scheme, a statement of planning policy, or an amendment to any of these. In the context of land use planning, a proposal is most likely to be a subdivision or a development application. A **strategic proposal** may embrace a structure plan or strategy plan.

Terms in bold in the text are defined in Appendix 1 Glossary.

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Acronyms

ANCA	Australian Nature Conservation Agency	FESA	Fire and Emergency Services Authority
ANEC	Australian Noise Exposure Contours	IBRA	Interim Biogeographic Regionalisation of Australia
ANEF	Australian Noise Exposure Forecasts	ICCWG	Infrastructure Co-ordinating Committee Working Group
ANZECC	Australian and New Zealand Environment and Conservation Council	IUCN	World Conservation Union
ARI	Assessment on Referral Information	JAMBA	Japan–Australia Migratory Bird Agreement
ARMCANZ	Agricultural Resource Management Council of Australia and New Zealand	km	kilometre
AS	Australian Standard	m	metre
ATSIC	Aboriginal and Torres Strait Islander Commission	MfP	Ministry for Planning
CALM	Department of Conservation and Land Management	NHMRC	National Health and Medical Research Council
CAMBA	China–Australia Migratory Bird Agreement	Noise Regulations	Environmental Protection (Noise) Regulations 1997
CAR	Comprehensive, adequate and representative	NPNC	National Parks and Nature Conservation Authority
CER	Consultative Environmental Review	NRM	Natural Resource Management
CSIRO	Commonwealth Scientific and Research Organisation	NRMC	Natural Resource Management Council
DCE	Department of Conservation and Environment	NWQMS	National Water Quality Management Strategy
DEC	Department for Environment and Conservation	PDWSA	Public Drinking Water Source Area

DEP	Department of Environmental Protection	PER	Public Environmental Review
DEWHA	Department of Environment, Water, Heritage and the Arts	PUEA	Proposal Unlikely to be Environmentally Acceptable
DIA	Department of Indigenous Affairs	RA	Responsible authority
DLI	Department of Land Information	s	section
DMA	Decision-making authority	SEA	Strategic Environmental Assessment
DoE	Department of Environment	SEP	State environmental policy
DoIR	Department of Industry and Resources	SPP	State planning policy
DoW	Department of Water	SWQMS	State Water Quality Management Strategy
DRF	Declared Rare Flora	SWS	State Water Strategy
DPI	Department for Planning and Infrastructure	TEC	Threatened ecological community
EIA	Environmental Impact Assessment	WA	Western Australia
EMF	Electromagnetic field	WALIS	Western Australian Land Information System
EP Act	Environmental Protection Act 1986	WAPC	Western Australian Planning Commission
EPA	Environmental Protection Authority	WRC	Water and Rivers Commission
EPP	Environmental protection policy	WSUD	Water sensitive urban design
EPS	Environmental Protection Statement	Vol	volume
ERMP	Environmental Review and Management Program		



**Environmental
Protection Authority**

Environmental Guidance for Planning and Development

Part A

**Environmental
Protection and Land Use
Planning in
Western Australia**

Part A

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Chapter A1

Overview of environmental protection and land use planning in Western Australia

The Environmental Protection Authority (EPA) encourages a concerted effort by all levels of government, industry, businesses, communities and the people of Western Australia to protect and enhance the environment. Environmental protection is a key component in achieving a sustainable future. The purpose of this guidance statement is to assist participants in land use planning and development processes to achieve environmentally sound outcomes.

The significance of environmental protection in Western Australia is highlighted in *The Western Australian State Sustainability Strategy* (Government of Western Australia 2003a) and the *Western Australian State of the Environment Report* (Environmental Protection Authority 2007).

Environmental protection in Western Australia is supported by legislation and government policy. Key legislation includes the *Environmental Protection Act 1986* (EP Act). Environmental protection is also a key element in the policy framework that guides land use planning and development in Western Australia (WAPC 1997, Government of Western Australia 2000a and 2003b).

Taking action to protect the environment is essential given that the *State of the Environment Report* shows a steady decline in the condition of the environment and an increase in the pressures people are placing on it.

A1.1 KEY ENVIRONMENTAL PRINCIPLES

The key environmental principles that provide the basis for the EPA's consideration of environmental issues and underlie the advice in this guidance statement are set out in the EP Act (s4A) and EPA Position Statement No. 7 *Principles of Environmental Protection* (EPA 2004a) (see over).

A1.2 TIERED ASSESSMENT OF ENVIRONMENTAL ISSUES DURING PLANNING

The land use planning and development system in Western Australia allocates land for various purposes and regulates certain types of development and land use. Planning decision-making influences environmental outcomes through a hierarchical or tiered planning framework. Various types of statutory and non-statutory processes are involved in the planning process:

- strategies and overarching policies (regional strategy plans and statements of planning policy)
- region schemes and their amendments
- local planning strategies
- town planning schemes and their amendments
- structure plans
- local planning policies
- subdivision approvals
- development and land use approvals.

Figure A1 presents an overview of the main steps in the planning process, from the broad regional scale to the local scale (see over).

Key environmental principles	
1. The precautionary principle	<p>Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, decisions should be guided by:</p> <ul style="list-style-type: none"> careful evaluation to avoid, where practicable, serious or irreversible damage to the environment an assessment of the risk-weighted consequences of various options.
2. Intergenerational equity	<p>The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.</p> <p>Conservation of biological diversity and ecological integrity</p> <p>Conservation of biological diversity and ecological integrity should be a fundamental consideration.</p>
3. Improved valuation, pricing and incentive mechanisms	<ul style="list-style-type: none"> Environmental factors should be included in the valuation of assets and services. The polluter pays principle – those who generate pollution and waste should bear the cost of containment, avoidance or abatement. The users of goods and services should pay prices based on the full life cycle costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any wastes. Environmental goals, having been established, should be pursued in the most cost effective way by establishing incentive structures, including market mechanisms, which enable those best placed to maximise benefits and/or minimise costs to develop their own solutions and responses to environmental problems.
4. Waste minimisation	<p>All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.</p>

(adapted from s4A EP Act)

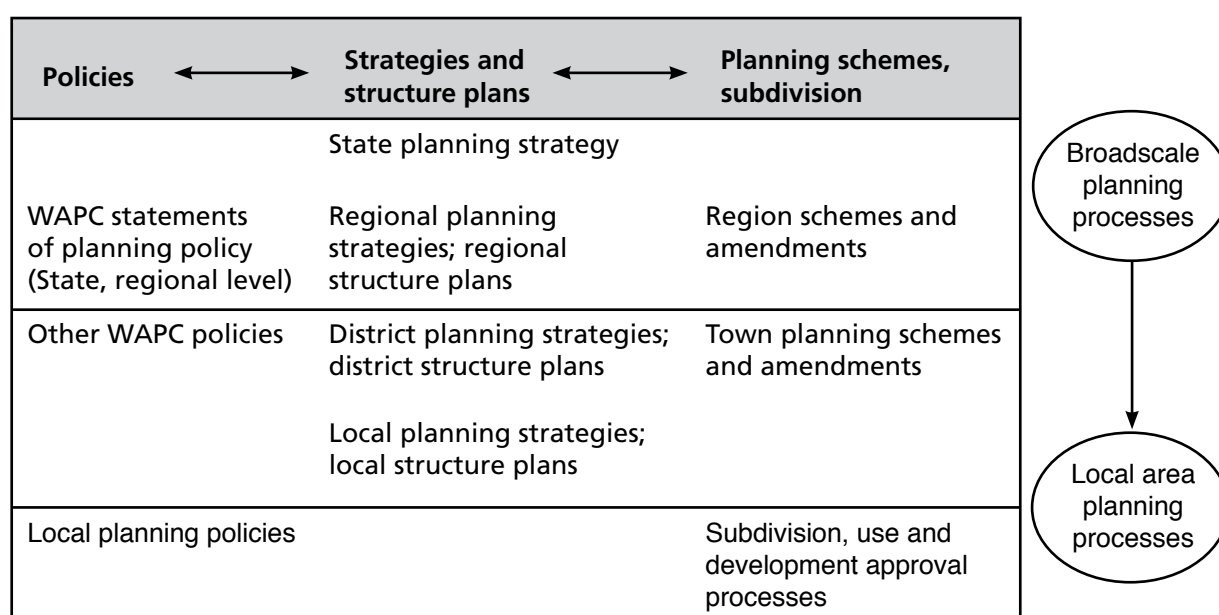


Figure A1. Overview of the tiered planning framework in Western Australia

The EPA expects a rational linkage between the consideration of environmental issues and the various levels or tiers of the planning process. The level of environmental information and evaluation required to support planning decision-making should depend on such matters as:

- the scale of planning (broad scale or local scale)
- the sensitivity and significance of the environment
- development pressures
- the amount of certainty that is required of the particular planning process.

For each environmental issue that applies to an area, there will generally be an optimum stage at which particular information should be provided. For example, when planning at the region scheme stage, the level of information and evaluation on issues such as biodiversity protection and catchment protection should be sufficient to address the issues at the broad regional scale.

The EPA anticipates that planning processes will be put in place to ensure adequate environmental information and evaluation at each stage of planning. For many issues this will be at an early stage of the planning. The principle of early assessment is embodied in the changes to the planning and environmental legislation in 1996 that introduced the assessment of schemes by the EPA.

In recognition of the state's tiered planning framework, each chapter in Parts B, C and D typically discusses two levels of environmental information and assessment:

1. Broad scale planning includes strategic and most structure planning, region schemes and their amendments, whole of municipality town planning schemes and some town planning scheme amendments.
2. Local area planning includes subdivision and development, some town planning scheme amendments and detailed local structure plans.

A1.3 INTEGRATING ENVIRONMENTAL PROTECTION AND LAND USE PLANNING

The EPA expects that land managers, decision-making authorities and consultants to developers will take responsibility in the first instance for pursuing environmentally sustainable development. The location, design and management of land uses and developments should be derived from appropriate studies, consultation and consistency with whole-of-government, agency, EPA and other accredited environmental strategies, policies and criteria.

Some of the main strategies, policies and agreements endorsed by government and applicable to environmental protection in Western Australia are listed in A1.3.1.

A range of agencies in Western Australia can provide environmental advice and have a role in environmental regulation. Table A1 identifies some key agencies, their roles and legislation of relevance to environmental planning issues. The roles of the EPA and DEC in relation to planning are further described in A1.3.2 and A1.3.3.

Environmentally sustainable outcomes are enhanced when land use planners and people proposing new land uses and developments adopt a consultative and integrative approach. Appropriate consultation with agencies, stakeholders and experts during planning processes assists, for example, catchment protection and the protection of rare flora and fauna.

Table A1. Environmental Planning: Key agencies, their roles and relevant legislation

AGENCY	ROLES	LEGISLATION
Australian Heritage Council www.ahc.gov.au	Promotes heritage and advises on whether a place meets the National Heritage criteria and the Commonwealth Heritage criteria Keeps the Register of the National Estate	<i>Australian Heritage Council Act 2003</i>
Conservation Commission www.conservation.wa.gov.au	Advisory and policy development body to the Minister; Vesting body for all terrestrial conservation areas, including national parks, conservation parks, nature reserves, State forests and timber reserves; Submits management plans for vested lands to the Minister; Develops policies to protect the State's natural environment and for the appreciation and enjoyment of that environment by the community; Promotes and facilitates community involvement; Advises the Minister on the management of native flora and fauna; Recommends guidelines for ecotourism; Sets performance criteria for assessing and auditing the performance of the Department of Environment and Conservation and the Forest Products Commission, in carrying out and complying with management plans; Advises the Minister on the application of the principles of ecologically sustainable forest management in the management of State forests and timber reserves and forest produce throughout the State; and to commission research for the purposes of its policy development function, with Ministerial approval.	Conservation and Land Management Act (1984)
Department of Agriculture Western Australia www.agric.wa.gov.au	Advises on sustainable land management Administers soil conservation notices	Agriculture Act 1998 Soil and Land Conservation Act 1985
Department of Consumer and Employment Protection www.docep.wa.gov.au	Administers the Occupational Safety and Health Act 1984; Administers safety regulation of electricity and gas infrastructure; Administers the storage, handling and transport of dangerous goods, including explosives; Administers a range of legislation relating to the Mineral and Petroleum industries	Occupational Safety and Health Act 1984 Electricity (Supply Standards and System Safety) Regulations 2001 Gas Standards (Gas Supply and System Safety) Regulations 2000 Dangerous Goods Act 2004 Mines Safety and Inspection Act 1994

AGENCY	ROLES	LEGISLATION
<p>Department of Environment and Conservation www.dec.wa.gov.au</p>	<p>Studies, regulates, and advises on protection of natural resources including (for example, wetlands, waterways, flora, fauna, land and air quality)</p> <p>Administers pollution prevention and environmental harm provisions of the EP Act including licensing of prescribed premises, works approvals, environmental protection notices, environmental protection directions, closure notices, prevention notices</p> <p>Assists the EPA</p> <p>Regulates clearing of native vegetation under the EP Act</p> <p>Advises on sustainable industry practices</p> <p>Advises on site and groundwater contamination issues</p> <p>Administers the transport of some hazardous wastes</p> <p>Advises on noise issues and administers some aspects of the <i>Environmental Protection (Noise) Regulations 1997</i></p> <p>Administers compliance with environmental protection policies</p> <p>Advises on waste management policy</p> <p>Advises on land use planning and development matters</p> <p>Develops community awareness programs</p> <p>Studies, protects, recovers and advises on native flora and fauna, threatened species and vegetation communities</p> <p>Licenses the taking of native fauna, flora, specially protected fauna and rare flora</p> <p>Acquires and manages conservation reserves</p> <p>Describes, documents and maintains databases on flora and fauna (Western Australian Herbarium) Oversees international wetland and migratory wildlife agreements (Ramsar, JAMBA and CAMBA) and World Heritage property</p> <p>Maintains WA listings for the <i>Directory of Important Wetlands in Australia</i> (Environment Australia 2001b)</p> <p>Advises on the management of natural land systems including visual landscape management</p>	<p><i>Environmental Protection Act 1986</i> and associated Regulations</p> <p><i>Swan River Trust Act 1988</i></p> <p><i>Contaminated Sites Act 2003</i></p> <p><i>Conservation and Land Management Act 1984</i></p> <p><i>Wildlife Conservation Act 1950</i></p>
<p>Department of the Environment, Water, Heritage and the Arts (Commonwealth) www.environment.gov.au</p>	<p>Manages Commonwealth environmental impact assessment applying to matters of national environmental significance</p> <p>Administers Natural Heritage Trust programs including Landcare, Bushcare, Rivercare, Coastcare</p> <p>Administers Commonwealth heritage legislation</p>	<p><i>Commonwealth Environment Protection and Biodiversity Conservation Act 1999</i></p> <p><i>Commonwealth Australian Heritage Council Act 2003</i></p>

AGENCY	ROLES	LEGISLATION
Department of Fisheries www.fish.wa.gov.au	Provides advice on issues with implications for fish resources management and aquaculture	<i>Fish Resources Management Act 1994</i>
Department of Health www.health.wa.gov.au	Has responsibilities for public health and safety issues including the provision of safe drinking water supplies, nuisances and offensive trades, radiation, the application of national guidelines, mosquitoes	<i>Health Act 1911 Radiation Safety Act 1975</i>
Department of Indigenous Affairs www.dia.wa.gov.au	<i>Administers the Aboriginal Heritage Act 1972</i>	<i>Aboriginal Heritage Act 1972</i>
Department of Industry and Resources www.doir.wa.gov.au	<p>Advises on business and State economic development</p> <p>Regulates the storage, handling and transport of dangerous goods, including explosives</p> <p>Administers a range of legislation relating to the mineral and petroleum industries</p> <p>Administers State Agreement Acts</p> <p>Carries out strategic planning, including risk modelling initiatives, for a number of major industrial estates</p>	<p><i>Petroleum Act 1967</i> and Acts relating to offshore petroleum activities</p> <p><i>Petroleum Pipelines Act 1969</i></p> <p><i>Mining Act 1978</i></p> <p><i>Mines Safety and Inspection Act 1994</i></p>
Department of Water www.water.wa.gov.au	<p>Responsible for water policy and planning</p> <p>Management of water resources in Western Australia.</p> <p>Water resources investigation and assessment</p> <p>Providing security for water for the environment and other community uses</p> <p>Licensing water for use</p> <p>Planning for water management, water source protection, drainage and floodplains.</p>	<p><i>Country Areas Water Supply Act 1947</i></p> <p><i>Land Drainage Act 1925</i></p> <p><i>Metropolitan Water Supply, Sewerage and Drainage Act 1909</i></p> <p><i>Metropolitan Water Authority Act 1982</i></p> <p><i>Rights in Water and Irrigation Act 1914</i></p> <p><i>Water Agencies (Powers) Act 1984</i></p> <p><i>Water and Rivers Commission Act 1995</i></p> <p><i>Water Boards Act 1904</i></p> <p><i>Water Services Licensing Act 1995</i></p> <p><i>Water Supply, Sewerage and Drainage Act 1912</i></p> <p><i>Waterways Conservation Act 1976</i></p>
Environmental Protection Authority www.epa.wa.gov.au	<p>Carries out environmental impact assessment</p> <p>Provides advice on key environmental issues</p> <p>Prepares environmental protection policies</p> <p>Audits compliance with Ministerial conditions for proposals for which the Department of Environment is the proponent</p>	<i>Environmental Protection Act 1986</i>

AGENCY	ROLES	LEGISLATION
Fire and Emergency Services Authority of Western Australia www.fesa.wa.gov.au	Responds to a range of hazards Facilitates the development and maintenance of emergency management arrangements for the State (fire, hazardous materials, storms, floods, cyclones, earthquakes) Provides advice and support on emergency management issues	Fire and Emergency Services Authority of Western Australia Act 1998 Bush Fires Act 1954
Heritage Council of Western Australia www.heritage.wa.gov.au	Administers the <i>Heritage of Western Australia Act 1990</i>	<i>Heritage of Western Australia Act 1990</i>
Infrastructure providers- Main Roads Western Australia www.mainroads.wa.gov.au Western Power www.wpcorp.com.au Alinta Gas www.alintagas.com.au Water Corporation www.watercorporation.com.au Aqwest www.aqwest.wa.gov.au Busselton Water Board www.busseltonwater.wa.gov.au Public Transport Authority www.pta.wa.gov.au	Plan and provide roads, railways, gas, power, water supply, wastewater management, stormwater management etc	Numerous Acts - see agency websites
Local government (web addresses on www.walga.asn.au)	Carries out strategic and statutory planning Plans and manages reserves including open space and roads, and land owned by local government Administers local laws Administers some requirements of the <i>Health Act 1911</i> and <i>Environmental Protection (Noise) Regulations 1997</i> Maintains local heritage listings Manages stormwater Collects and disposes of municipal waste, administers kerbside recycling Co-ordinates many initiatives involving local communities, for example, Local Agenda 21, Cities for Climate Change, TravelSmart	<i>Local Government Act 1995</i>

AGENCY	ROLES	LEGISLATION
Natural Resource Management Council www.nrm.org.au	Has a leadership role in natural resource management (NRM) in Western Australia	
Regional and local natural resource management groups and catchment councils	Regional groups co-ordinate delivery of natural resource and catchment initiatives, for example, Avon Catchment Council, Northern Agricultural Catchments Council, Rangelands NRM Co-ordinating Group, South West Catchments Council, Swan Catchment Council, South Coast Regional Initiative Planning Team. Sub-regional groups also carry out this role, for example, Geopraphe Catchment Council Landcare and community environmental groups have an important role in on-ground management	
State planning agencies (Western Australian Planning Commission (WAPC), Department for Planning and Infrastructure (DPI) and development agencies) www.dpi.wa.gov.au www.wapc.wa.gov.au www.epra.wa.gov.au www.mra.wa.gov.au www.landcorp.com.au	WAPC sets out overarching planning policy Strategic and statutory planning Transport and infrastructure planning (DPI functions include administering the Dampier to Bunbury gas pipeline corridor) DPI co-ordinates advice on Perth's Bush Forever conservation strategy Land acquisition and management	Main planning Acts for the State: <i>Planning and Development Act 2005</i>
Swan River Trust www.swanrivertrust.wa.gov.au	Manages the Swan and Canning Rivers (including drainage into these river systems) and regulates development within the Swan River Trust management area	<i>Swan River Trust Act 1988</i>
Western Australian Museum www.museum.wa.gov.au	Maintains databases on fauna	<i>Museum Act 1969</i>
Waste Management Board	Provides independent advice to Government on waste management issues	<i>Environmental Protection (Landfill Levy) Act 1998</i>

¹ This table is indicative only. It does not purport to fully list agencies, their roles and legislation. In each particular instance, readers should make their own enquiries to ascertain the relevant agencies, processes and statutory requirements.

A1.3.1 KEY ENVIRONMENTAL STRATEGIES AND POLICIES

Over the last two decades there has been growing global community expectation that best practice will be applied to environmental matters in all spheres of human activity. This growth in community expectation is reflected in legislation and agreements at the international level, to which Australia has become signatory and which have been translated into national and state strategies, agreements and legislation. These include over 300 Acts and Ordinances that impact on environmental matters in Australia (Hughes 1999 in EPA 2002a).

Some of the most significant agreements, strategies and policies relevant to environmental planning issues in Western Australia are listed below.

International

Agenda 21—the Global Blueprint for Sustainability (Rio Earth Summit 1992)
Asia–Pacific Migratory Waterbird Conservation Strategy: 2001-2005 (2001)
China–Australia Migratory Bird Agreement (CAMBA)(1986)
Convention Concerning the Protection of the World Cultural and Natural Heritage (Paris 1972)
Convention on Biological Diversity (Rio de Janeiro 1992)
Convention on International Trade in Endangered Species of Wild Fauna and Flora (1975)
Convention on the Conservation of Migratory Species of Wild Animals (Bonn 1979)
Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar 1971)
Japan–Australia Migratory Bird Agreement (JAMBA)(1974)
Montreal Protocol on Substances that Deplete the Ozone Layer (1992)

National

Asia Pacific Partnership on Clean Development and Climate (2005) Australia's National Framework for Environmental Management Systems in Agriculture (2002)
Australia's Ocean Policy (1998)
Australian Guidelines for Establishing the National Reserve System (1999)
Commonwealth Coastal Policy (1995)
Council of Australian Governments Water Reform Framework (1994)
Directory of Important Wetlands (Environment Australia 2001)
Local Agenda 21 (1997)
National Action Plan for Salinity and Water Quality (2000)
National Environment Protection Measures National Forest Policy Statement (2nd edition 1995)
National Framework for Natural Resource Management Standards and Targets (2002)
National Framework for the Management and Monitoring of Australia's Native Vegetation (2001)
National Greenhouse Strategy (1998)
National Local Government Biodiversity Strategy (1998)
National Natural Resource Management Monitoring and Evaluation Framework (2002)
National Principles and Guidelines for Rangeland Management (1999)
National Objectives and Targets for Biodiversity Conservation 2001–2005 (2001)
National Strategy for Ecologically Sustainable Development (1992)
National Strategy for the Conservation of Australia's Biological Diversity (1996)
National Water Quality Management Strategy (introduced 1992; comprises 21 guideline documents)
National Weeds Strategy (1999)
Natural Heritage Trust (established 1997)
State of the Environment Reports (1996, 2001)
Wetlands Policy of the Commonwealth Government of Australia (1997)

State

Bilateral Agreement between the Commonwealth of Australia and the State of Western Australia to deliver the Natural Heritage Trust (2002)

Bush Forever (2000)

Department of Environment and Conservation Regional and Area Management plans under the *Conservation and Land Management Act 1984*

Environmental Action: the Government's Response to the State of the Environment Report (1999)

Hope for the Future: State Sustainability Strategy (2003)

Local Agenda 21 (1992)

Managing the Rangelands (1999)

Perth Air Quality Management Plan (2000)

Regional Forest Agreement for the South-West Forest Region of Western Australia between the Commonwealth of Australia and the State of Western Australia (1999)

State Government's Response to the Salinity Taskforce Report (2002)

State of the Environment Report (1998)

State Salinity Strategy (2000)

State Water Quality Management Strategy (2001)

State Water Strategy (2003)

Stormwater Management Manual for Western Australia (DEC, 2004)

Western Australian Greenhouse Strategy (2004)

Western Australian Natural Resource Management Framework Policy (1999)

Western Australian State Sustainability Strategy (2003)

Wetlands Conservation Policy for Western Australia (1997)

State planning policy

In Western Australia, three key planning documents give land use planning its strategic direction in relation to protecting the environment:

1. State Planning Strategy (WAPC 1997)
2. State Planning Policy No. 1 State Planning Framework Policy (Government of Western Australia 2000a, WAPC 2006)
3. State Planning Policy No. 2 Environment and Natural Resources Policy (Government of Western Australia 2003b).

The *State Planning Strategy* provides a framework for future land use decision-making and planning by agencies across government, and in particular the Western Australian Planning Commission (WAPC). It sets out the environmental principle 'to protect and enhance the key natural and cultural assets of the state and deliver to all Western Australians a high quality of life which is based on sound environmentally sustainable principles'.

Strategies to protect the biophysical environment include:

- prevent further loss in biodiversity
- ensure that water resources are conserved and their quality protected
- ensure the land and soil is safeguarded and that degradation does not occur
- promote planning, management and protection of resources
- protect landscape, open space and public access.

The State Planning Framework Policy State Planning Policy No. 1 provides the policy and strategy context for decision-making on land use and development in Western Australia. It stipulates that planning should contribute to a more sustainable future by:

- promoting the conservation of ecological systems and the biodiversity they support including ecosystems, habitats, species and genetic diversity
- assisting in the conservation and management of natural resources to support environmental quality and sustainable development over the long term
- protecting areas and sites with significant historic, architectural, aesthetic, scientific and cultural values from inappropriate land use and development
- adopting a risk management approach which aims to avoid or minimise environmental degradation and hazards
- preventing environmental problems which might arise as a result of siting incompatible land uses close together.

The *Environment and Natural Resources Policy* State Planning Policy No. 2 sets out a range of general and specific measures to protect and enhance the natural environment and to promote the sustainable use and management of natural resources.

Other state planning policies of relevance to environmental planning are in Table B1 and Table C1.

A1.3.2 THE ROLE OF THE EPA

The EPA is a statutory authority and is the primary provider of independent environmental advice to Government. The role of the EPA in land use planning is outlined in this section. Its broader role is described in Appendix 2.

The planning legislation requires that most planning schemes and their amendments be referred to the EPA to decide whether to apply formal environmental impact assessment (Chapter A2). The planning and environmental legislation were amended in 1996 to allow environmental assessment at the scheme formulation stage. Chapter A3 describes the procedures the EPA applies to the referral and assessment of schemes.

The EPA also decides whether or not to assess subdivision and development proposals that are referred under s38 of the EP Act, and may carry out assessment. The assessment and referral processes for significant proposals are outlined in Chapter A4.

Following amendments to the EP Act in 2003, the EPA may decide to formally assess a strategic or structure plan associated with significant environmental issues at the level of strategic environmental assessment (Chapter A4).

The EPA may also provide advice on planning matters that raise significant environmental issues, including advice pursuant to s16 EP Act, and guidance through the EPA's Position Statements and Guidance Statements series. EPA publications are listed in E2.

The EPA is assisted by the EPA Service Unit comprising the Environmental Impact Assessment and Policy Divisions of the Department of Environment and Conservation (DEC). Other divisions of the DEC also provide technical advice to the EPA.

Following approval of a strategy plan, scheme, policy or planning application, the EPA usually does not have an ongoing role unless stated in any statement of conditions issued by the Minister for the Environment, or stated in the approved plan or policy.

The main roles of the EPA in relation to planning instruments are outlined in Table A2.

Table A2. The role of the EPA in planning: Strategies, schemes, planning applications and policies

PLANNING INSTRUMENT	THE ROLE OF THE EPA
Region strategy plan or structure plan District structure plan Local structure plan	Where there are significant environmental issues, the EPA may: <ul style="list-style-type: none"> • carry out strategic environmental assessment • Provide advice under S16 EP Act • Provide informal advice (EPA or EPA Service Unit).
Region scheme, region scheme amendment, Town planning scheme, town planning scheme amendment	Following the referral of a scheme to the EPA, the EPA: <ul style="list-style-type: none"> • decides whether to assess the scheme • may provide informal advice when the scheme is not assessed • may carry out formal environmental assessment (Division 3 Part IV EP Act) • may find that the scheme is incapable of being made environmentally acceptable.
Subdivision application Development application	Following the referral of a proposal under S38 EP Act, the EPA: <ul style="list-style-type: none"> • decides whether to assess the proposal • may provide informal advice when the proposal is not assessed • may carry out informal environmental assessment (Division 1 Part IV EP Act).
State planning policy	Where a State planning policy is formally referred to the EPA by the WAPC, the EPA: <ul style="list-style-type: none"> • decides whether to assess the State planning policy • may carry out a formal environmental assessment (Division 3 Part IV EP Act) • Alternatively, the EPA or EPA Service Unit may provide advice.
Other WAPC policy	The EPA or EPA Service Unit may provide advice when significant environmental issues apply.
Local government or other planning policy	The EPA or EPA Service Unit are usually not involved, but may provide advice if significant environmental issues apply.

A1.3.3 THE ROLE OF DEC

DEC has a broader role in providing environmental advice, research and administering the requirements of the water resources and environmental legislation as outlined in Table A1.

Usually, the DEC Regional Offices provide the DEC's advice on planning matters. Regional officers may contact DEC's specialist branches or the EPA Service Unit when needed. Where planning agencies or others identify a clear need for environmental advice on a new subdivision, development application, structure plan or planning strategy, it is usually appropriate to first contact the relevant DEC Regional Office (for addresses, see the DEC website www.dec.wa.gov.au).

When the EPA is involved with a planning process, the EPA and DEC work closely together. For example, when a scheme or proposal that raises significant environmental issues is formally referred to the EPA, the EPA Service Unit is likely to consult the relevant DEC Regional Office and other branches for technical advice before the EPA decides whether to assess the scheme or proposal.

For general advice on environmental matters, consult the relevant DEC Regional Office. If advice is required by authorities or the public on a proposal or scheme that may need to be formally referred to the EPA, the request should be directed to the EPA Service Unit for procedural enquiries.

Whether or not the DEC provides advice, the actual process of the formal referral of a proposal to the EPA remains a responsibility of the **decision-making authority** as set out in the EP Act.

A1.3.4 ENVIRONMENTAL ASSESSMENT BY THE COMMONWEALTH GOVERNMENT AND NON-WA STATE GOVERNMENTS

Some proposals considered by land use planning and development processes may be subject to environmental impact assessment procedures by the Commonwealth Government or another state government as well as the Western Australian Government.

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* establishes an environmental assessment and approval system that is distinct from the state system. However, a bilateral agreement between the Commonwealth and state governments is in operation to minimise duplication of environmental impact assessment processes and to strengthen intergovernmental cooperation. The bilateral agreement sets out the processes to be followed including referral processes and liaison between the parties. The agreement can be sighted on the Commonwealth Department of Environment Water, Heritage and the Arts website at www.environment.gov.au.

A person who proposes to take an action that will have, or is likely to have, a significant impact on a matter of national environmental significance that is subject to the provisions of the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* is responsible for referring the action to the Commonwealth Government for a decision on whether approval is required.

Information on the Commonwealth assessment and approval process is available from the Commonwealth Department of Environment Water, Heritage and the Arts.

The *Environmental Impact Assessment (Part IV Division 1) Administrative Procedures 2002* (Government of Western Australia 2002a) identify procedures that the EPA will adopt when a proposal involves or is likely to involve more than one jurisdiction.

A1.4 CONSIDERING ENVIRONMENTAL ISSUES DURING PLANNING

The EPA recommends the following steps during land use planning, to help land use planners and participants in planning processes to identify relevant environmental issues and protect the environment. See Parts B to D for more detailed advice on specific **environmental factors** and **environmental issues**.

To assist day-to-day decision-making, the EPA encourages each local government to collate the available environmental information on the municipality. This information base will provide useful context for the local government when considering environmental issues. An indicative list of topics for an environmental information base for a municipality is in Attachment A1-1.

The following steps are provided to assist the consideration of environmental issues only. Participants in planning processes should ensure that all matters of relevance to planning are adequately addressed.

A1.4.1 BROAD SCALE PLANNING

The following nine steps provide a framework of actions to help ensure environmental issues are appropriately considered during broad scale planning, for example, strategic and structure planning and the preparation of planning schemes.

The level of environmental information required at each broad scale planning stage should be carefully considered. When development has the potential to have adverse environmental impacts, field survey work, modelling, assessment, and advice by experts may be appropriate early in planning. If this is not done or if sufficiently detailed information is not available, this should be clearly noted to assist future information gathering and assessment, and a precautionary approach taken. Some, if not most, issues will need to be considered in a context that is larger than the immediate planning area, as environmental issues may extend beyond the study area boundaries.

1. Identify and consider all relevant environmental factors and issues.

The EPA's checklist of environmental factors (Table A3 in Chapter A2) is a useful starting point when identifying possible environmental issues. Broadly, environmental issues relate to:

- the protection of special and representative natural areas
- maintaining the ecological processes that sustain life and a healthy environment
- the prevention of pollution
- the protection of the community's health, safety, amenity and cultural identity.

2. Consider government and other recognised environmental policies, strategies and criteria.

An indicative list of overarching government policies, strategies and agreements is in A1.3.1. Most agency websites (Table A1) provide a useful initial indication of relevant environmental policies, strategies and criteria.

3. Consider relevant site attributes, values and issues.

For each environmental factor, examine relevant study area attributes, values and any issues associated with those attributes, and their significance. Consider threats to environmental values.

4. Consider environmental objectives, priorities and criteria/targets.

Identify **environmental objectives**, priorities and **criteria/targets** as appropriate for the study area, having regard for government and other recognised policies and strategies.

5. Consider the environmental impacts from all potential land use changes.

To provide greater certainty for subsequent planning processes, modelling of impacts and comparing the results against environmental objectives and criteria/targets may be appropriate early in the planning process.

6. Consider integration with other decision-making and strategic processes.

To ensure acceptable environmental outcomes in areas where there are important environmental issues and development pressures, planning should consider integration with regional, issue-specific or holistic environmental strategies (such as biodiversity protection or water management strategies). The EPA has set out a framework for natural resource management in EPA Preliminary Position Statement No. 8 Environmental Protection in Natural Resource Management (EPA 2004b).

7. Consult with the community, relevant agencies and stakeholders.

It is recommended that relevant government agencies (see Table A1), the community and stakeholders are consulted in accordance with an appropriate consultation plan. If environmental issues of key significance for the state may be impacted, the EPA or EPA Service Unit may provide advice during the preparation of a broad scale planning instrument. Referral of schemes and strategic proposals to the EPA are addressed in A3 and A4.

8. Identify appropriate planning mechanisms to meet environmental objectives

On the basis of the information and outcomes from the steps above, consider appropriate locations in the planning area for land use categories and planning mechanisms to meet environmental objectives. Key elements may include:

- maintaining adequate buffers between land uses associated with pollution and sensitive land uses
- protecting environmentally significant areas (for example, by reserves; buffers; no intensification of development)
- assisting to manage or prevent local/regional environmental problems such as salinity, erosion.

9. Identify procedures to be implemented at subsequent stages of planning

Ensure that all relevant environmental issues and values will be adequately taken into account at each subsequent planning stage, for example, identify further studies and investigations; schedule the preparation of local policies to help deal with different categories of issues.

A1.4.2 LOCAL AREA PLANNING

The steps below are a framework of actions that help to ensure environmental issues are fully considered during decision-making on rezonings, detailed guide plans, subdivision and development applications.

Decision-making on a specific land use or development will generally be more effective if it is preceded by comprehensive strategic planning for the region that incorporates the considerations outlined in A1.4.1.

The provision of timely and adequate information to assist decision-making is essential. Site-specific investigations, modelling of potential environmental impacts, identifying management measures, and demonstrating that acceptable criteria will be met are emphasised when gathering information at the local area planning stages. Environmental management plans and programs can be important management measures. The key elements of these may need to be sighted by a decision-making authority before a proposal is conditionally approved.

Attachment A1-2 outlines the main matters that environmental management plans should cover.

1. Identify and consider all potential environmental factors and issues.

The checklist of environmental factors (Table A3 in Chapter A2) is a useful starting point when identifying possible environmental issues associated with the site, its setting and the proposed use or development.

2. Consider government and other recognised environmental policies, strategies and criteria

An indicative list of overarching government policies, strategies and agreements is in A1.3.1. Most agency websites (Table A1) provide a useful initial indication of relevant environmental policies, strategies and criteria.

3. Consider the existing environment and its attributes, values and significance for each environmental factor.

4. Consider environmental objectives, priorities and criteria/targets relevant to the site and the proposed land use or development for each relevant environmental factor.

5. Identify potential emissions and environmental impacts from the proposed new development on the surrounding environment and people.

6. Identify whether off-site emissions may affect the proposed rezoning, subdivision or development.

7. Consider integration with other decision-making and strategic processes.

Ascertain whether the project requires other approvals, and whether there are advantages in integrating planning information requirements and condition-setting with other processes.

8. Consult with the community, relevant agencies, stakeholders and experts as appropriate.

Consider consultation with relevant government agencies (see Table A1), the community, stakeholders and experts. Referral of schemes and strategic proposals to the EPA are addressed in A3 and A4.

9. Evaluate whether environmental objectives can be met.

Does the available information demonstrate that environmental objectives and criteria can be met? When assessing the environmental acceptability of a project, consider:

- the site location
- the site layout and design
- the conditions that will be applied relevant to the construction, operation and decommissioning phases of development.

Where a proposed land use, development or subdivision is not likely to meet environmental objectives and criteria (having regard for the advice of advisory agencies or experts where appropriate), refusal of the proposal by the relevant decision-making authority should be considered.

Where refusal is not likely, the proposal should be referred to the EPA if indicated by the guidance in A4.2.1.

Attachment A1-1

Suggested environmental information base for local government

This list will assist local government to develop an environmental information base. It reflects the key environmental factors used by the EPA in its environmental impact assessment process. Local issues may point to a need for information on additional factors.

General

- Most recent aerial photography (for some areas satellite imagery is useful)
- Contour information (maps at largest scale available)
- Cadastral information, showing reserves, types and vesting of reserves, privately owned land
- Existing land use map

Biophysical

- Native vegetation mapping and reports
 - location of remnant vegetation (with date of mapping)
 - original and remaining extent of vegetation units (broad scale mapping is available for Western Australia. See Western Australia Land Information System (WALIS) website at www.walis.wa.gov.au).
 - location of significant vegetation, for example, poorly retained vegetation units
 - any available information on threatened ecological communities, declared rare and priority flora, and any other significant communities and significant flora
 - any other vegetation mapping and reporting that has been carried out for the area
- Native fauna mapping and reports
 - location of threatened fauna and other significant fauna
 - sites used by JAMBA and CAMBA species
- Wetlands mapping and reports
 - location of wetlands
 - as applicable, location of wetlands subject to the Swan Coastal Plain Lakes and South West Agricultural Zone Wetlands environmental protection policy; Ramsar wetlands; wetlands in *A Directory of Important Wetlands in Australia* (Environment Australia 2001b)
 - where available, management category mapping from DEC (conservation/resource enhancement/ multiple use management category wetlands)
- Waterways mapping including minor and major drainage lines
- Flood study areas
- Public drinking water source protection areas and areas under investigation as potential future drinking water sources
- Groundwater, surface water and catchment mapping and reports, maximum groundwater level
 - catchments supporting special environments, for example, wetlands, karst
 - catchment management plans
 - water management plans
- Coast and near-shore marine areas
 - coastal landforms, and coastal areas subject to accretion and erosion
- Landforms and features, for example, dunes, plains, karst
 - mapped landforms and features
 - areas of landscape significance, for example, ridge lines, scarps
- Salinity mapping and reports
- Land prone to hazards, for example, fire hazard areas, subsidence and cliff risk areas, coastal storm erosion areas

- Soil mapping
 - soil/landscape or soil types mapping
 - environmental geology maps
 - soil qualities mapping, for example, Phosphorous Retention Index, erosion-prone soils, water logged soils, soils high in organic material, land prone to slip, collapse or subsidence
 - acid sulfate soil risk areas
 - other mapping and reports indicating areas at risk of environmental degradation or not suitable for development
- Natural resource management plans and reports

Pollution Management

- Location of land uses associated with off-site emissions and their buffers (agreed or generic). Emissions include dust, odour, other emissions to air, noise and risk. Land uses include industries and infrastructure, for example, power station, waste water treatment plant
- Contaminated sites (known and potential). DEC issue a list of land uses associated with site contamination in the Contaminated Sites Management Series.
- Major roads, railways, high pressure gas pipelines, high voltage power lines

Social Surroundings

- Indigenous heritage sites
- Heritage sites on all lists, for example, World Heritage, National Heritage, Commonwealth Heritage, Register of the National Estate, Heritage Council of Western Australia, National Trust, local municipal inventory, other local lists
- Sites of natural character used for recreation
- Sites of natural character with high visual amenity

Notes

Sources of mapping or information include but are not limited to WALIS, Department for Planning and Infrastructure (DPI), DEC, Department of Agriculture, DoIR, Department of Indigenous Affairs (DIA), Department of Water (DoW), WA Museum, Heritage Council of WA, Australian Heritage Council, catchment and land care groups.

The user should be aware of the limitations of sources of information.

In the absence of existing information at an appropriate level of detail, site-specific studies may need to be carried out by appropriately qualified people. This is usually the responsibility of the party seeking change.

Where more detailed information for a region would assist in ensuring planning and environmental objectives are met, it may be helpful for processes to be developed for regional assessments and strategies, for example, biodiversity strategy, water management strategy, air quality management strategy.

Attachment A1-2

Environmental management plans, programs and systems

The EPA prefers to use the framework and terminology of the AS/NZS ISO 14000 series for environmental management plans, environmental management programs and environmental management systems.

The term **environmental management plan** is used where the purpose is to prepare management actions, schedules, resources and responsibilities for achieving environmental objectives and targets with respect to a particular site or environmental factor.

Some projects require the preparation and implementation of a number of environmental management plans to address a range of potential environmental impacts, for example, noise, vegetation, dust. Together, a group of plans may constitute an **environmental management program**.

The overarching system incorporating all environmental management plans and programs relevant to a project is the **environmental management system**. AS/NZS ISO 14001:2004 *Environmental Management Systems—Requirements with Guidance for Use* enables organisations to develop environmental management systems that will achieve environmental and economic objectives.

This attachment concentrates on the environmental management plan as the basic unit of an environmental management system.

Main components

An environmental management plan will generally need to have sections that address the following:

- Current status, including description of project, the nature of the existing environment as relevant to the issue to be managed (for example, regional and specific conservation values of natural areas such as wetlands or bushland) and other relevant information, for example, legislation, policies and approvals and their implications
- Potential environmental impacts
- Environmental objectives of the management plan
- Performance indicators/criteria, for example, DEC licence criteria, ANZECC water quality criteria, site specific criteria, vegetation diversity/density, noise regulations, Australian Standards
- Management actions applying to individual stages of the project (design, construction, operation, closure) including responsibilities, schedules and resources for management actions (unless an Environmental Management System AS/NZS ISO 14001:2004 is being applied to the project)
- Monitoring plan to enable compliance with objectives and criteria to be checked. The purpose of monitoring is to check the state of the environment and to use the results to trigger management actions.
- Reporting of monitoring results to DEC
- Contingency actions including responses to complaints and trigger criteria
- Stakeholder consultation
- Review and updating of management plan
- Relevant figures and tables.

Chapter A2

Environmental impact assessment

Western Australia's environmental impact assessment process is applied to planning schemes and proposals that could result in a significant adverse impact on the environment.

The legislative framework for the process is provided by Part IV of the *Environmental Protection Act 1986* (EP Act). The administrative procedures adopted by the Environmental Protection Authority (EPA) for dealing with schemes are set out in this guidance statement (Chapter A3). Procedures for proposals are outlined in Chapter A4 and set out in more detail in the *Environmental Impact Assessment (Part IV Division 1) Administrative Procedures* (Government of Western Australia 2002a) and guides published from time to time by the EPA (see E2.4).

Terms

Environmental impact assessment is described by the EPA as an orderly and systematic process for evaluating a **scheme** or a **proposal**, including its alternatives where relevant, and its effects on the environment, including the mitigation and management of those effects.

When the EPA carries out environmental impact assessment pursuant to the provisions of Part IV of the EP Act, the process is sometimes known as formal assessment.

EPA objectives for environmental impact assessment

- ***To ensure that proponents and responsible authorities take primary responsibility for the protection of the part of the environment impacted by their proposals and schemes.***
- ***To ensure that best practice measures are implemented in order to avoid unacceptable impacts on the environment, and that proposals and schemes meet relevant environmental objectives and standards to protect the environment.***
- ***To promote the key environmental principles set out in the Environmental Protection Act 1986 and EPA Position Statement No. 7 Principles of Environmental Protection (EPA 2004a).***
- ***To achieve a 'net environmental benefit' and to avoid adverse environmental impacts by promoting (in order of preference) avoidance of adverse environmental impacts, minimisation, rectification, reduction and environmental offsets (EPA 2004c).***
- ***To provide opportunities for public participation during the assessment process.***
- ***To promote continuous improvement in environmental performance.***
- ***To ensure that independent and reliable advice is provided to the Government before decisions are made.***
- ***In the case of schemes, to provide increased certainty to those involved with and affected by the land use planning and development process, that subsequent proposals under assessed schemes require no further assessment by the EPA unless new issues are raised or new information becomes available.***

A2.1 ENVIRONMENTAL SIGNIFICANCE

In deciding whether a scheme or proposal will be subject to the formal environmental impact assessment process, the EPA takes into account the environmental significance of any potential impacts that may result from the implementation of the scheme or proposal.

The EPA considers that environmental significance is a function of:

- the extent and consequence of impacts on biophysical aspects
- the environmental values of the area affected
- the extent of emissions and their potential to unreasonably interfere with the health, welfare, convenience, comfort or amenity of people the potential for biophysical impacts of the proposal to significantly and adversely change people's social surroundings

- the extent and rigour to which potential impacts have been investigated and described in the referral, and the confidence in the reliability of predicted impacts
- the extent to which the proposal implements the principles of sustainability
- the ability of decision-making authorities to place conditions on the proposals to ensure required environmental outcomes are achieved
- the likely level of public interest, and the extent to which the proponent has consulted with interested and affected people and responded to issues raised (*Environmental Impact Assessment (Part IV Division 1) Administrative Procedures*).

Chapters A3 and A4 and the chapters on each environmental factor discuss the triggers for formal environmental impact assessment for schemes and proposals.

A2.2 ENVIRONMENTAL FACTORS AND ENVIRONMENTAL ISSUES

When the EPA assesses a proposal or scheme it is required to report on the key environmental factors identified during its assessment of a proposal, and the environmental factors relevant to a scheme.

Although environmental factors can be identified on a case-by-case basis, the EPA has formulated a comprehensive checklist (Table A3) to assist the identification of all relevant factors. The broad categories of factors used by the EPA are biophysical, pollution management and social surroundings. The checklist is a convenient way to ensure that the full range of environmental factors is considered at each stage of planning. However, it is not an exhaustive list and other ways of categorising environmental factors may be appropriate for particular planning and development issues.

The term environmental issue is also used by the EPA to refer to matters of environmental interest or concern. Sometimes an issue may embrace a group of factors.

Parts B, C and D of this guidance statement discuss the EPA's position, policies and criteria on selected environmental factors and issues. The guidance statement identifies the environmental aspects of most concern for each factor and issue. It discusses management advice to protect the environment, and potential impacts that may require referral of a proposal to the EPA (most schemes are required to be referred to the EPA). The names of the factors and issues may vary, depending on the particular assessment.

A2.3 CRITICAL ENVIRONMENTAL ASSETS

Critical environmental assets are the most important environmental assets in the State. The term **critical environmental assets** was introduced by the EPA in EPA Position Statement No. 9 (EPA 2006a). The EPA seeks full protection of these assets.

In many cases a proposal or scheme that is likely to lead to impacts on a critical environmental asset will require referral to the EPA and subsequent assessment under Part IV of the EP Act. Guidelines for the referral of a scheme or proposal to the EPA are outlined in A3.2.1 and A4.2.1.

TABLE A3. EPA CHECKLIST OF ENVIRONMENTAL FACTORS*(relevant chapter numbers are given in brackets)***BIOPHYSICAL**

- **Conservation areas (B1)**
- **Biodiversity and ecological communities (B1, B2, B3)** sub-factors include threatened ecological communities, marine ecological communities
- **Native terrestrial vegetation and flora (B2)** sub-factors include internationally/nationally/regionally/locally significant vegetation, Declared Rare Flora, Priority Flora, other significant flora, marine flora, weeds, diseases and fire regime.
- **Native terrestrial fauna (B3)** sub-factors include internationally/ nationally/ regionally/ locally significant fauna and fauna habitat, threatened fauna, fauna protected by international agreements (for example, JAMBA and CAMBA), subterranean fauna, marine fauna and marine habitat, disease, exotic fauna and fire regime.
- **Wetlands (B4, C3)** sub-factors include wetlands protected under an environmental protection policy, Ramsar wetlands, Wetlands listed in the Directory of Important Wetlands in Australia and conservation/ resource enhancement/multiple use management category wetlands.
- **Waterways (B5, C3)** sub-factors include estuaries and inlets.
- **Public drinking water sources (B6, C3)** sub-factors include proposed public drinking water sources.
- **Groundwater (B4, B5, B6, B9, C3)** sub-factors include groundwater supplying significant wetlands/coastal areas/estuaries/ waterways and underground wetlands/cave pools.
- **Soils, land (B7)** sub-factors include salinity, acid sulfate soils, erosion-prone soils, waterlogged soils, land prone to slip, collapse or subsidence.
- **Landscape and landforms (B8)** sub-factors include dunes, karst and beach ridge plain.
- **Coastal areas**
- **Marine areas**
- **Biophysical processes that may affect human health, safety and amenity or the environment** sub-factors include cyclones and floods (B5).

POLLUTION MANAGEMENT

- **Air quality (C2)** sub-factors include odour, dust and particulates, air toxics, spray drift, greenhouse gases, photochemical smog, stratospheric ozone depletion, sulphur dioxide, carbon monoxide, lead and haze.
- **Water management (C3)** sub-factors include groundwater quality, surface water quality, marine water quality, eutrophication, stormwater management, effluent disposal, saline water and acid sulfate soil leachate.
- **Noise and vibration (C4)**
- **Light (C5)**
- **Radiation and electromagnetic fields (C5)**
- **Contaminated sites (C6)**
- **Waste management (C7)**

SOCIAL SURROUNDINGS

- **Culture and heritage in relation to the biophysical environment** sub-factors include Aboriginal culture and heritage and non-indigenous culture and heritage (D1, D2).
- **Visual amenity (D3)**
- **Recreation (D4)**
- **Risk to the public from 'hazardous industrial plant'** (see D5 for EPA position on risk)

SELECTED ISSUES INVOLVING A NUMBER OF FACTORS

- **Environmentally sustainable development** (all chapters in Parts B, C and D are relevant)
- **Integrated water cycle management** (Part B chapters, C3)
- **Conservation areas (B1, B2, B3, B4, B5, B8, B9, B10, D1, D2, D3)**
- **Natural resource/catchment management** (most chapters in Parts B, C and D are relevant)

In the first instance, during the formulation of a scheme or proposal, the EPA expects that every attempt will be made to avoid adverse environmental impacts on critical assets. Where special circumstances exist for significant impacts on critical environmental assets, the EPA recommends that government approval is conditional on:

- full consideration of alternatives
- a high level of justification and technical information
- impact mitigation and management, having regard for the EPA's latest position (EPA 2004c).

In general, there is a presumption against recommending approval for proposals that are likely to have significant adverse impacts on 'Critical Assets'.

In addition to critical environmental assets, there are other environmental assets that require a high level of protection. These **high value assets** are identified, together with critical environmental assets, in each of the chapters on biophysical factors in Part B under the heading **areas of high conservation significance**. Proposals with the potential for impacts on high value assets may need to be referred to the EPA (A4.2.1). In the instances when the EPA does not assess proposals or schemes that impact on high value assets, the environmental impacts will be evaluated and managed by the relevant government agency approval processes.

For the purposes of the environmental impact assessment process, the EPA's list of critical assets includes the following categories.

Public conservation reserve system

- Nature reserves, national parks, conservation parks, regional parks, marine parks, marine nature reserves and marine management areas (in accordance with the *Conservation and Land Management Act 1984* and *Land Administration Act 1997*).

Native vegetation

- Native vegetation where clearing would be in serious variance with the principles listed under Schedule 5 EP Act, namely 'Native vegetation should not be cleared if:
 - a) it comprises a high level of biological diversity
 - b) it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for fauna indigenous to Western Australia
 - c) it includes, or is necessary for the continued existence of, rare flora
 - d) it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological community
 - e) it is significant as a remnant of native vegetation in an area that has been extensively cleared
 - f) it is growing in, or in association with, an environment associated with a watercourse or wetland
 - g) the clearing of the vegetation is likely to cause appreciable land degradation
 - h) the clearing of the vegetation is likely to have an impact of the environmental values of any adjacent or nearby conservation area
 - i) the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water
 - j) the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.'

Ecological communities

- Ecological communities maintained above 30% of the pre-clearing extent of each ecological community in a bioregion (Environment Australia 2001a, EPA 2000a)
- Ecological communities in constrained areas on the Swan Coastal Plain maintained above 10% of the pre-clearing extent of the ecological community (Government of Western Australia 2000b, EPA 2003a, or as accepted by the EPA)
- Bush Forever sites

Biodiversity

- Declared Rare Flora (species listed pursuant to the *Wildlife Conservation Act 1950*)
- Declared Threatened Fauna (species listed pursuant to the *Wildlife Conservation Act 1950*)
- Threatened Ecological Communities in the following categories: presumed totally destroyed; critically endangered; endangered; vulnerable; data deficient (pursuant to the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* and as accepted by the EPA having regard for the advice of the Department of Environment and Conservation (DEC).
- Species subject to the China–Australia Migratory Bird Agreement and the Japan–Australia Migratory Bird Agreement

Wetlands

- Ramsar wetlands
- Wetlands listed in *A Directory of Important Wetlands in Australia* (Environment Australia 2001b)
- Wetlands protected by environmental protection policies
- Conservation category wetlands as identified by Department of Environment and Conservation (DEC), in the Geomorphic Wetlands Swan Coastal Plain dataset.

Rivers

- Wild and scenic rivers (as identified by the Australian Heritage Commission and the DEC)

Drinking water sources

- Public drinking water sources (pursuant to the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* and *Country Areas Water Supply Act 1947*)

Contamination

- Land and water protected from contamination:
 - likely to present a significant risk to human health or the environment
 - in excess of prescribed environmental or health standards
(in accordance with the EP Act, *Contaminated Sites Act 2003* and *Health Act 1911*)

Landscape and landforms

- Important landscapes, landforms, natural features or environmental icons (as accepted by the EPA in accordance with the EP Act)

Emissions, discharges and threats

- Clean and healthy environment protected from the following:
 - new emissions/discharges or an addition to existing emissions/discharges likely to present a significant risk to human health or the environment
 - new emissions/discharges or an addition to existing emissions/discharges likely to exceed a prescribed environmental or health standard
 - new organisms, processes or activities likely to threaten:
 - the survival, abundance or evolutionary development of a native species or ecological community
 - ecological processes that maintain life.
(In accordance with the EP Act and *Health Act 1911*.)

Heritage

- Natural areas of state, national or world heritage significance (as identified by the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*, *Heritage of Western Australia Act 1990* and as accepted by the EPA)
- Natural areas of indigenous heritage importance (having regard for the *Aboriginal Heritage Act 1972* and as accepted by the EPA).

Other

- Other priority environmental assets with important environmental values (as accepted by the EPA in accordance with the EP Act).

Chapter A3

Environmental impact assessment of schemes

A3.1 TYPES OF SCHEMES TO BE REFERRED TO THE EPA

Planning schemes and redevelopment schemes, together with their amendments, are required to be referred to the Environmental Protection Authority (EPA) by the responsible authority for a decision by the EPA on whether to assess them under the formal environmental impact assessment (EIA) process.

State planning policy (s26 *Planning and Development Act 2005*) or their amendments are types of schemes that may optionally be referred to the EPA by the Western Australian Planning Commission (WAPC).

The relevant planning Act defines when and how referral to the EPA shall be made. The legislative requirements for the environmental impact assessment of schemes are mostly set out in Division 3 Part IV of the *Environmental Protection Act 1986* (EP Act). The environmental assessment of schemes is sometimes referred to as 'the Section 48A process'.

The *Planning Legislation Amendment Act 1996* introduced the environmental assessment of schemes in specific recognition that in many instances it is more appropriate to apply environmental assessment at the rezoning or scheme formulation stage than to leave it to the subdivision or development stage (Western Australian Government 1995).

A3.2 STEPS IN THE EIA PROCESS FOR SCHEMES

The main steps in the EIA process for schemes are usually as follows.

1. The scheme is referred to the EPA by the responsible authority, accompanied by sufficient information for the EPA to set the level of assessment.
2. The EPA makes a decision on whether to assess or not assess the scheme. This decision is not appealable. Where the

TERMS

Scheme (s3 EP Act)

- a redevelopment scheme within the meaning of the *East Perth Redevelopment Act 1991*, the *Subiaco Redevelopment Act 1994*, the *Armadale Redevelopment Act 2001*, the *Midland Redevelopment Act 1999*, or an amendment to a redevelopment scheme
- a master plan within the meaning of the *Hope Valley–Wattleup Redevelopment Act 2001*, or an amendment to the master plan
- an amendment to the Metropolitan Region Scheme
- a regional planning scheme, or an amendment to a regional planning scheme
- a town planning scheme, or an amendment to a town planning scheme
- a state planning policy to which section 26 of the *Planning and Development Act 2005* applies, or an amendment to such a statement.

Assessed scheme (s3 EP Act)

- (i) a scheme which has been subject to the formal environmental impact assessment process and in respect of which a ministerial statement has been delivered to the responsible authority under s48F(2)
 - (a)
- (ii) for the purposes of Part IV Environmental Impact Assessment, EP Act, also includes
 - (a) a scheme which the EPA has decided does not require formal assessment
 - (b) a scheme in respect of which the responsible authority has not been informed of the level of assessment within 28 days after the referral of that scheme to the EPA under the relevant scheme Act
 - (c) a town planning scheme or town planning scheme amendment prepared pursuant to the planning legislation requirement that local planning conform with the region scheme and the region scheme (or amendment to the region scheme) is a scheme to which paragraph (i), (a) or (b) applies

and does not include a scheme determined to be incapable of being made environmentally acceptable.

A scheme other than a state planning policy must be an assessed scheme before it can be finalised under the planning legislation.

Responsible authority

The EP Act uses the term to refer to the authority responsible for a scheme, or for different types of subdivision.

EPA decides to assess the scheme, the next steps are:

3. The EPA issues instructions for the preparation of an environmental review document. The instructions are subject to an appeal period.
4. Following the determination of any appeals against the instructions, the environmental review document is prepared.
5. The environmental review document is released for public review simultaneously with the advertising period for the scheme under the relevant scheme Act.
6. Following the scheme advertising period, the responsible authority informs the EPA of its views on, and responds to, the environmental issues raised by submissions made during the advertising period.
7. The EPA completes its assessment and provides its report and recommendations to the Minister for the Environment.
8. Following the determination of any appeals made after the publication of the EPA's report, and consultation with the minister responsible for the scheme and the relevant decision-making authorities, the Minister for the Environment issues a statement setting out the environmental conditions to which the scheme should be subject. The minister may alternatively decide that a statement will not be issued, because there are environmental reasons why the scheme should not be implemented.

The process includes statutory timelines (Table A4). The planning and the environmental legislation provides for the extension of timelines in specified circumstances.

The relevant planning and environmental legislation sets out more fully the steps in the environmental impact assessment process for schemes.

TERMS

Deferred factor

Deferred factor is a non-statutory term that may be applied by the EPA to an assessed scheme when the EPA considers that an environmental factor does not need to be evaluated in detail at the time the scheme is formulated, but needs to be adequately considered and protected at an appropriate later stage of planning. Often this will be the stage of preparation of a subdivision or development application. However, in the case of a region scheme, it may be when a town planning scheme amendment is prepared.

Usually a deferred factor is an environmental factor for which detailed information was not provided to the EPA at the time of a referral or formal assessment, and was not essential at that time.

The EPA may list deferred factors in its letter of advice that a scheme does not need formal assessment, or in its report on a formally assessed scheme.

If the deferred factors are not fully considered and protected at an appropriate later stage of planning through suitable design, management and legally enforceable requirements, the EPA may apply the formal environmental impact assessment process at that stage.

In the case of a **proposal under an assessed scheme** where:

- the assessed scheme is the subject of a deferred factor, and
- it is likely that there will be a significant environmental impact in relation to the deferred factor if the proposal is implemented

the responsible authority has an obligation to either refuse to approve the implementation of the proposal, or to refer the proposal to the EPA pursuant to s48I EP Act.

Important note: The reader is referred to s3 EP Act for the legal definition of scheme, assessed scheme, responsible authority and proposal under an assessed scheme.

Table A4. Statutory timelines and the scheme environmental impact assessment process

STAGE	TIMELINE
EPA decides to assess or not assess a scheme.	Within 28 days of referral (s48A(1)(a) EP Act)
EPA issues instructions on the environmental review to responsible authority.	Within 60 days of referral (s48A(1)(b)(i) EP Act)
Public appeal period on instructions	Ends 14 days from date of issue to responsible authority (s100(1)(c) EP Act)
EPA decides whether environmental review document meets requirements of instructions.	Within 30 days from submission of final draft to EPA (under relevant scheme Acts)
Public review period	As specified by the relevant planning Acts or, if not specified, then EPA determines (s48C(3), (4), (5) and (6) EP Act)
Responsible authority sends copy of submissions on environmental review to EPA.	Within 7 days of the expiry of the public submission period (under relevant scheme Acts)
Responsible authority responds to EPA on submissions on environmental review.	Within 42 days of the end of the public review period (under relevant scheme Acts)
EPA reports to Minister for the Environment.	Within 60 days of the end of the public review period, or within 30 days of the receipt of the response to submissions, but not more than 72 days of the end of the public review period (whichever is the later) (s48D(1) EP Act) OR Such longer period as the Minister for the Environment allows (s48D(2) EP Act)
Public appeal period on EPA report	Ends 14 days from publication of report (s100(3a)(c) EP Act)

The recommended pre-referral steps and outline of initial processes leading to the EPA setting the level of assessment are indicated in the flowchart at Figure A2. The steps in the formal environmental impact assessment process for local government schemes are depicted in Figure A3.

A3.2.1 REFERRAL TO THE EPA

For a town planning scheme or an amendment to a town planning scheme, referral is made by giving to the EPA:

- written notice of the resolution to prepare or adopt a town planning scheme, or to prepare an amendment to a town planning scheme
- such written information about the town planning scheme or amendment as is sufficient to enable the EPA to decide whether or not to assess the scheme.

(derived from s81 Planning and Development Act 2005)

Where a scheme is likely to be associated with environmental impacts, the EPA generally expects that referral will occur at the stage of initial adoption of the scheme by a responsible authority when information to assist the EPA to make a decision on the scheme is likely to be available.

A sample cover letter to accompany a referral is provided at Attachment A3-1.

To assist responsible authorities to provide appropriate referral information, the EPA has prepared the guide entitled Referral of a Scheme to the EPA and Environmental Checklist (See Attachment A3-2)

All schemes need to be accompanied by adequate information describing the relevant environmental factors, the environmental impacts that could potentially occur, and how each impact will be managed to ensure protection of the environment. Responsible authorities are urged to ensure that schemes comply with recognised environmental criteria, including the advice in the EPA's guidance statement and position statement series.

To facilitate the timely processing of scheme referrals, the EPA requests that a completed Environmental Checklist and the environmental information requested in the checklist are submitted at the time of referral, as the EPA often does not have local or site specific information. Since the checklist may be updated from time to time, the latest version should be used. This is available from the EPA website at www.epa.wa.gov.au. The checklist should be completed by the responsible authority. If the information provided to the EPA is insufficient for the EPA to decide whether to assess the scheme, additional information may be requested by the EPA.

In the case of a proposed scheme that raises potentially significant environmental issues, and a region or whole of municipality scheme, the EPA encourages pre-referral consultation with the EPA Service Unit's Planning and Infrastructure Branch.

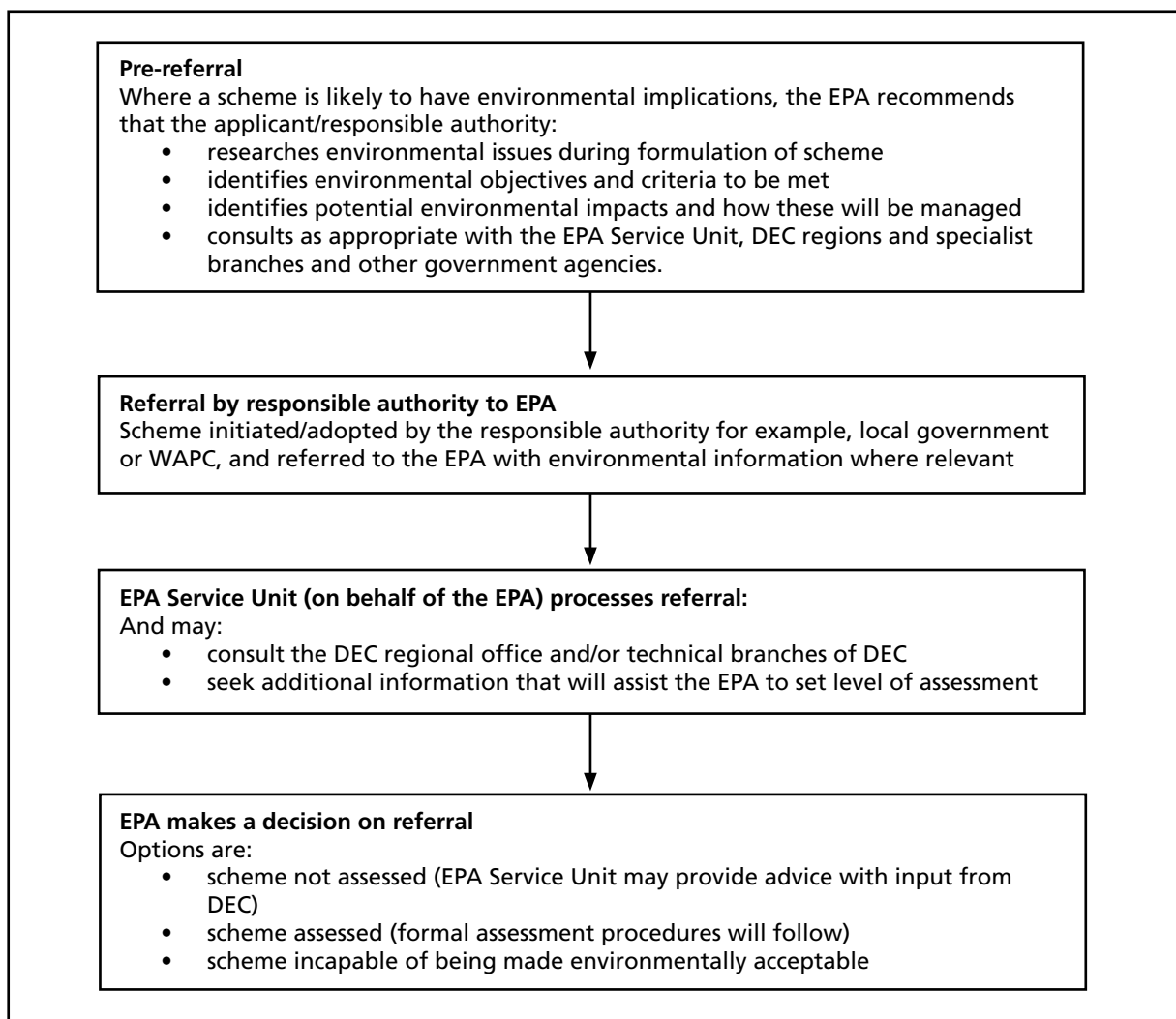


Figure A2. The scheme referral process

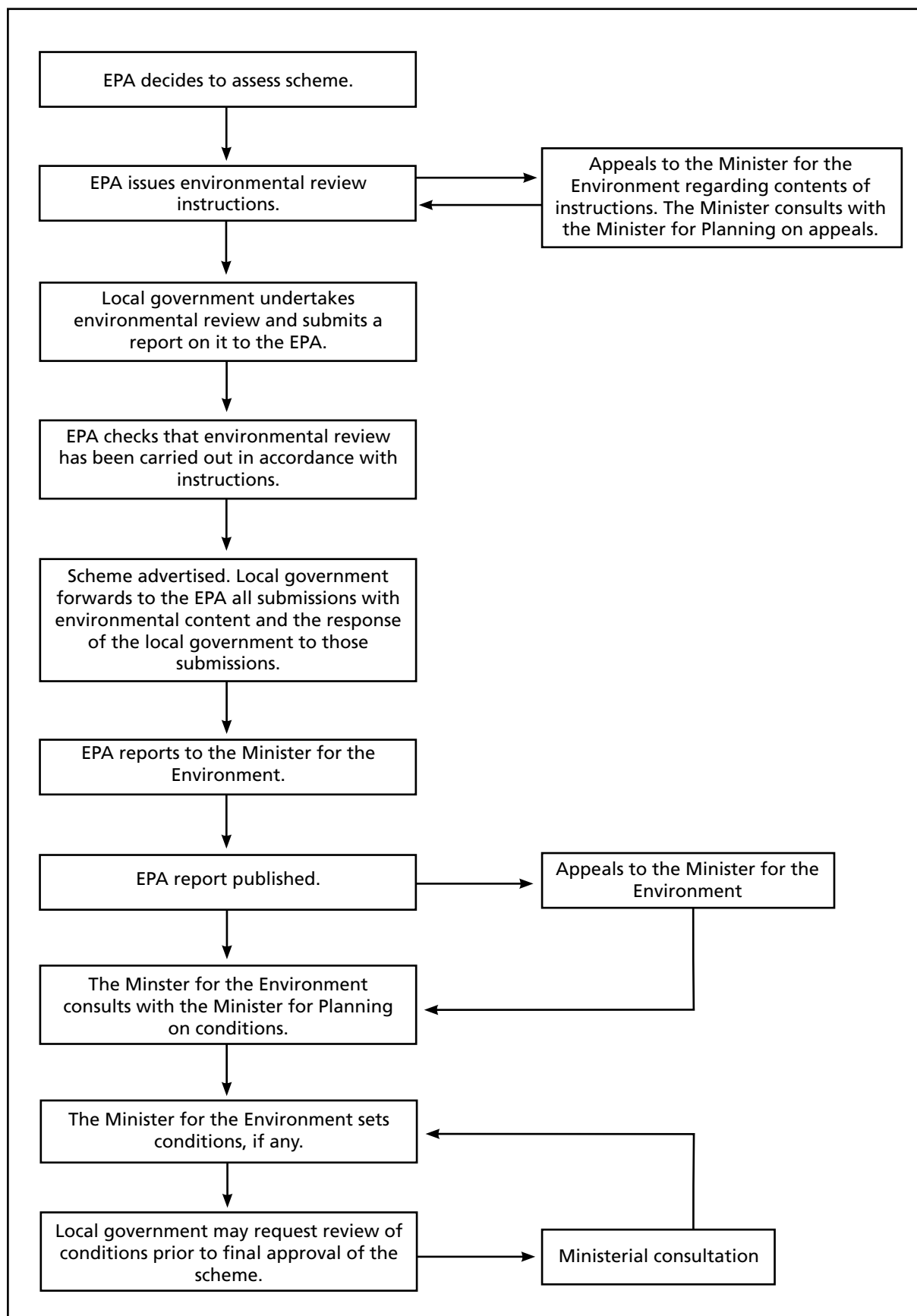


Figure A3. The environmental impact assessment process for local government schemes (indicative only). Under the planning legislation, the Minister for Planning, before finally approving the scheme, must be satisfied that the conditions, if any, to which a scheme is subject are incorporated into the scheme.

Parts B to D of this guidance statement provide further guidance on the information that assists the EPA to set the level of assessment in relation to specific environmental factors.

Statutory timeline

Under the EP Act, the EPA has 28 days after a referral has been made to decide whether or not to assess a scheme. A scheme is not considered to be referred until the EPA has sufficient written information about the scheme to enable it to decide whether to assess the scheme. If the information is insufficient, the EPA will require further information from the responsible authority.

A3.2.2 EPA DECISION ON A SCHEME

The EPA decides to assess or not assess a scheme, or informs that a scheme is incapable of being made environmentally acceptable. There are no appeal rights against the EPA's decision.

If the EPA does not inform a responsible authority whether the scheme is to be assessed within 28 days of the scheme being properly referred, the scheme is deemed to be an **assessed scheme**.

If the EPA decides not to assess a scheme, it may provide advice.

The EPA decision applies to the scheme as it was referred to the EPA. Sometimes changes are proposed to a scheme that the EPA has decided will not be assessed. Should a change be proposed that is likely to result in adverse impacts on the environment, the EPA should be advised before the amendment is finalised.

Table A5 describes the types of decisions that the EPA may make.

Table A5. Types of decisions by the EPA on referred schemes

DECISION BY THE EPA	COMMENTS
Scheme not assessed, no advice given	The scheme does not raise environmental issues. Alternatively, the environmental issues relevant to the scheme can be readily managed through the proposed scheme provisions or during the subsequent stages in the planning process.
Scheme not assessed, non-binding advice given	The scheme raises environmental issues. However, the potential environmental impacts that may result from the scheme do not warrant detailed environmental assessment by the EPA at this stage. In these cases, the EPA provides publicly available advice to promote a good environmental outcome. The advice is provided to the responsible authority and relevant government agencies, and to others on request. If the EPA considers that some factors require detailed consideration at an appropriate later time, the EPA may identify deferred factors in its advice.
Scheme assessed	The EPA considers that the environmental issues raised by the scheme require assessment, and may warrant the setting of environmental conditions. A scheme that is assessed by the EPA will typically be subject to the procedures outlined in A3.2.3 to A3.2.8. This process is also called formal assessment.
Scheme incapable of being made environmentally acceptable	The EPA may decide that the scheme is by its nature incapable of being made environmentally acceptable. In this case, the EPA informs the responsible authority and the Minister for the Environment in writing of this decision. The Minister for the Environment, upon being informed, may direct the EPA to assess the scheme, or may consult with the Minister for Planning to reach agreement that the scheme is incapable of being made environmentally acceptable. In the latter case, upon reaching agreement, the Minister for the Environment then informs the EPA, the responsible authority and any relevant decision-making authorities. If the ministers cannot agree, the matter is referred to the Governor for a decision.

As soon as practicable after deciding to assess a scheme, officers of the EPA Service Unit and the responsible authority will liaise to discuss procedures and a timetable for actions to progress the assessment by the relevant parties.

A3.2.3 ISSUE OF INSTRUCTIONS

When the EPA decides to assess a scheme it usually requires the responsible authority to undertake an environmental review of the scheme and report on it to the authority. The EPA may also require any person to provide information, and to make such investigations and enquiries as the EPA thinks fit.

The EPA issues instructions to the responsible authority on the scope and content of the environmental review. The purpose of the environmental review is to provide information on the existing environment, the environmental issues, the potential environmental impacts, and how it is proposed that the environmental issues will be managed to meet the EPA's objectives for environmental protection. The environmental review provides information to enable the EPA to carry out assessment and the public and stakeholders to comment on the environmental aspects of the scheme.

Instructions must be provided to the responsible authority by the EPA within 60 days of the date of referral, and are appealable by the public. The appeal period is made known through an advertisement in a Monday edition of the *West Australian* newspaper. There is a 14-day appeal period on the scope and content of the instructions, during which time anyone, on payment of a \$10 fee, may appeal in writing to the Minister for the Environment.

The instructions detail the environmental factors to be addressed in the environmental review document, the manner in which they are to be addressed (for example, some may require modelling or studies to be undertaken to predict the likely effects on the environment) and other information to be included.

If no appeal against the instructions is lodged, confirmation of the final instructions is provided to the responsible authority at the end of the appeal period. If an appeal is lodged, the instructions are provided after the Minister for the Environment determines the appeal or appeals after consulting with the minister responsible for the scheme. The EP Act sets out procedures to be followed in the event of a disagreement between the ministers.

A3.2.4 PREPARATION OF THE ENVIRONMENTAL REVIEW DOCUMENT

The responsible authority's environmental review document cannot be released for public review until it has been prepared in accordance with the EPA's final instructions.

To expedite assessment and to ensure that the criteria for the release of the environmental review document are met, the EPA encourages the responsible authority and the people carrying out the environmental review to consult with the EPA Service Unit.

The EPA must formally respond to the responsible authority on the acceptability of the draft document within 30 days of receiving it. Otherwise, it is deemed to have been approved for release. If the responsible authority disagrees with the EPA as to whether the review document has been prepared in accordance with the instructions, it can request the minister responsible for the scheme to consult with the Minister for the Environment to resolve the matter. The EP Act sets out procedures to be followed in the event of a disagreement between the ministers.

When deciding whether the environmental review document is suitable for release, the EPA checks that all the environmental factors and items listed in the instructions have been addressed to the extent required in the instructions. The document must be understandable by the general public, and should contain no vexatious or inappropriate material. The EPA also tries to ensure that the scientific basis for key conclusions is sound and that the document contains no obvious errors of fact or science.

EPA authorisation to release a review document does not imply that the EPA has assessed the scheme, or that it agrees with all the material in the document, including the proposed management of environmental factors. At this stage, the document is simply considered adequate for release for public review.

Statutory time limits do not apply to the time taken to prepare an environmental review document. The time taken is largely determined by the responsible authority and those preparing the document.

A3.2.5 PUBLIC REVIEW

The EPA regards public involvement as fundamental to the assessment process, and is committed to encouraging and providing opportunity for public participation in the environmental impact assessment process before recommendations are made.

People with an interest in a scheme or living near or within a scheme area often have important local knowledge relevant to environmental impact assessment.

The public review period for schemes is usually linked to the scheme advertising period under the relevant planning legislation. Where a scheme Act provides for advertising of the scheme, the environmental review document approved by the EPA must be incorporated into the scheme report and made available for public comment with the scheme.

Notices are inserted by planning authorities in newspapers inviting public comment on the scheme and environmental review and in the EPA's column in a Monday edition of the *West Australian* newspaper.

The public is invited to make submissions to the responsible authority. The responsible authority is required to forward a copy of each submission relating wholly or in part to environmental issues raised by the scheme to the EPA within seven days of receipt.

A3.2.6 RESPONDING TO ISSUES

The planning legislation requires the responsible authority to inform the EPA of its views on, and response to, the environmental issues raised by submissions. The EPA must be informed within 42 days of the end of the scheme advertising period, or such longer period as the minister responsible for the scheme allows. Following consideration of submissions, the responsible authority may decide whether to modify the proposed scheme provisions or scheme map, or it may require further actions prior to pursuing the scheme.

All submissions received by the EPA will be treated as publicly available unless specifically marked confidential.

Within seven days of the EPA receiving a copy of the submissions with environmental content, it is usual for either the responsible authority or the EPA to develop a summary of the environmental issues raised in relation to each environmental factor. The responsible authority responds to the items in this summary.

A3.2.7 EPA REPORT AND RECOMMENDATIONS

Following receipt of the responsible authority's response to submissions, the EPA completes its assessment of the scheme and submits a report and recommendations to the Minister for the Environment.

The EPA considers the information in the environmental review, environmental issues raised by the public, specialist advice from government agencies, the response of the responsible authority to those environmental issues, the EPA's own research and, in some cases, research provided by other expert agencies. The summary of submissions and the responsible authority response to them are typically published by the EPA in its report and recommendations to the Minister for the Environment.

Section 48D of the EP Act requires the EPA to report to the Minister for the Environment on the assessment of a scheme within a period of:

- 60 days from the end of the public review period, or
- 30 days from receiving the response to submissions, but not more than 72 days after the end of the public review period,

whichever is the longer.

Ministerial approval needs to be obtained to exceed these time periods.

The EPA is required to report on:

- the environmental factors relevant to the scheme, and
- the conditions, if any, to which the scheme should be subject.

The EPA may make such recommendations in its report as it sees fit.

The EPA's report is published and advertised in the EPA's advertisement in a Monday edition of the *West Australian* newspaper. There follows a period of two weeks in which to lodge an appeal to the minister on the content of the report or its recommendations. Appeals cost \$10.

A3.2.8 CONDITION SETTING AND FINALISATION OF THE EIA PROCESS

The final stages of the environmental impact assessment (EIA) process for schemes include the determination of any appeals on the EPA's report and recommendations, setting environmental conditions (if applicable) and concluding the EIA process.

The Minister for the Environment consults with the minister responsible for the scheme on the implementation of the scheme and the conditions, if any, to which the scheme should be subject. Relevant government agencies are also typically consulted.

Following agreement between the two ministers, the Minister for the Environment causes a statement to be issued that sets out the environmental conditions, if any, to which the scheme should be subject, and advises that there is no environmental reason why the scheme should not be implemented subject to those conditions.

In the event of a disagreement, the EP Act sets out the procedures that should be followed.

For practical purposes, a condition will generally be one of two types, as follows:

- a condition which requires modification of the scheme text or scheme map before the scheme is approved by the responsible minister and gazetted, or
- a condition which requires that certain steps be taken or circumstances to exist before the scheme is approved by the responsible minister and gazetted.

Copies of the agreed conditions are provided to the responsible authority, relevant Ministers, decision-making authorities and the EPA, and are then made publicly available.

Conditions cannot be appealed. However, before final approval for the scheme is granted, the responsible authority may request the minister responsible for the scheme to initiate a review of the conditions.

Final approval for a scheme is given by the minister responsible for the scheme. In the case of a scheme that has been assessed by the EPA, the responsible minister cannot give final approval to a scheme until that minister has received the Minister for the Environment's statement following the completion of the formal assessment process, and the conditions, if any, in the statement have been incorporated into the scheme. In the case of town planning schemes and their amendments, see the *Planning and Development Act 2005*.

A3.3 REGION SCHEMES AND TOWN PLANNING SCHEMES

New town planning schemes and region schemes may be associated with a large range of environmental issues. To expedite the processing of their eventual referral to the EPA, the EPA recommends that the EPA Service Unit be contacted at an early stage in the formulation of a new scheme to discuss information and referral requirements.

In considering new town planning schemes, the EPA has, to date, concentrated on the following:

- the key environmental issues facing the responsible authority, including those identified in the Local Planning Strategy
- the land use and zoning changes proposed through the new scheme (including changes to the zoning table), and analysis of the environmental implications associated with these changes, particularly impacts on the conservation estate and potential conflicts between incompatible land uses
- the strategies and scheme provisions to manage the environmental impacts associated with the proposed land use changes and key local environmental issues, where appropriate (including scheme objectives and procedures for dealing with planning applications).

The EPA may also consider existing reservations and zonings if it is of the opinion that a proposal framed in accordance with an existing reservation or zoning is likely, if implemented, to have a significant effect on the environment.

When considering a region scheme or a region scheme amendment, the EPA usually focuses on regional environmental issues such as protection of regionally significant natural areas or natural resources such as public drinking water source areas.

At the town planning scheme stage, more detailed environmental information is usually required than for region schemes. For example, the protection of local wetlands and other environmental features may need to be reflected through scheme provisions or scheme map designations.

Attachment A3-1

Sample letter# referring a scheme* to the EPA

The Chairman
Environmental Protection Authority
Locked Bag 33
Cloisters Square
PERH WA 6850

REFERRAL OF A SCHEME TO THE EPA

(NAME OF SCHEME)

Pursuant to s81 of the *Planning and Development Act 2005*, the above scheme is referred to the EPA for consideration of the need for environmental assessment.

Please find enclosed:

- a copy of the *(fill in name of responsible authority/s)* resolution to initiate/prepare/adopt the scheme *(it is preferred that a scheme is referred at adoption)*;
- an electronic copy / X copies of the scheme documentation;
- a copy of the completed environmental checklist; and
- additional information as follows:
 -
 -

Should you have any enquiries on this matter, please contact *(name of person)* on *(phone number)* or *(email address)*, in the first instance.

(Name and position of person sending letter) (Date)

Encl.

- # This sample letter is provided as a guide only. Variations are acceptable.
- * In this sample letter, the term **scheme** is used in accordance with its meaning in the *Environmental Protection Act 1986*, and includes amendments to town planning schemes.

Attachment A3-2

Referral of a Scheme to the EPA and Environmental Checklist

REFERRAL OF A SCHEME



Environmental Protection Authority

Referral of a Scheme to the Environmental Protection Authority

PURPOSE OF THIS GUIDE

Referral requirements are set out in the planning legislation relevant to the scheme*, and include a requirement that the EPA is given such written information about the scheme as is sufficient to enable the EPA to comply with section 48A of the *Environmental Protection Act 1986* i.e. to decide whether or not to assess the scheme.

The purpose of this guide is to help clarify referral requirements.

Whilst the EPA has some general information for each municipality, it often does not have local or site specific information. Under the relevant planning legislation, it is the role of the authority responsible for the scheme to provide sufficient information. The information that is likely to be sufficient in most instances is indicated in this guide. The EPA will advise if further information is required. Upon receiving sufficient information, the EPA must make a decision within 28 days on whether or not to assess the scheme.

A referral must contain:

- A copy of council's resolution to prepare or adopt the scheme. Referral upon adoption is preferred as more information is usually available at that time.
- Scheme documentation - a hard copy of the referral of the scheme (as defined under the *Environmental Protection Act 1986*), text and map/s, **together with** an electronic copy of the documentation (see Spatial Data for Environmental Impact Assessment attached), as follows:
 - a compact disc version of the scheme, or scheme amendment, in PDF (Portable Document Format) file format, contained in a soft clear plastic adhesive-backed envelope;
 - spatial data (GIS or CAD) on CD, depicting the scheme/amendment extent, geo-referenced and conforming to the following parameters:
 - Datum: GDA94;
 - Projection: Geographic (latitude/longitude) or Map Grid of Australia (MGA);
 - Format: Arcview shapefile, Arcinfo coverages, Microstation or AutoCAD.
- Sufficient information for the EPA to decide whether or not to assess the scheme. This will usually be a completed **Environmental Checklist** (see over), and, in cases where the scheme may have environmental implications, the following:
 - clear identification on a map of the location of the land to which the scheme applies
 - an outline development plan or subdivision guide plan, where appropriate
 - information on relevant items in the environmental checklist (see over)
 - when electronic documentation is not available, additional copies of the scheme documentation for the EPA Service Unit to forward to the Department of Environment and Conservation and other agencies for technical advice.

If the information submitted to the EPA is not sufficient for the EPA to decide whether or not to assess the scheme, the EPA may request additional information.

The EPA Service Unit's Planning and Infrastructure Branch can advise on referral requirements and issues of environmental significance. Liaison with the EPA Service Unit may be particularly helpful in the following instances - schemes raising potentially significant environmental issues, and whole-of-municipality town planning schemes. The Planning and Infrastructure Branch can be contacted by ringing 6364 6500 and asking for an environmental officer who deals with the region.

* In this form, the term **scheme** has the same meaning as in *Environmental Protection Act 1986*, and includes town planning schemes, regional planning schemes and their amendments.

Referral of a scheme to the Environmental Protection Authority

ENVIRONMENTAL CHECKLIST

Title of scheme*: _____

This checklist is intended to assist authorities responsible for schemes to identify potential environmental issues, and to supply the information that the EPA requires to decide whether or not to assess a scheme.

Please tick the appropriate box and supply the information indicated at Section D below to the EPA. For clarification of any terms or descriptions used, please refer to EPA Guidance No. 33 'Environmental Guidance for Planning and Development' or the Planning and Infrastructure Assessments Branch of the EPA Service Unit.

A. Biophysical factors

Yes No Unsure

- | | |
|---|---|
| <p>1. Does the area to which the scheme applies contain or adjoin any of the following?</p> <p>a) bushland. If yes, identify</p> <p>b) a wetland (includes seasonally damp land), watercourse or river - if yes, identify</p> <p>c) an estuary or inlet. If yes, identify</p> <p>d) coastal area or near-shore marine area. If yes, identify</p> <p>e) a public water supply area. If yes, identify</p> <p>f) a landform of special interest, for example, karst, beach ridge plain. If yes, identify</p> <p>2. Is any area to which the scheme applies in a catchment that is of particular environmental concern or interest?</p> <p style="padding-left: 20px;">If yes, identify the catchment:</p> <p style="padding-left: 40px;">Lake Clifton catchment</p> <p style="padding-left: 40px;">Swan Coastal Plain catchment of the Peel-Harvey Estuary</p> <p style="padding-left: 40px;">Swan and Canning Rivers catchment (other than Ellenbrook catchment)</p> <p style="padding-left: 40px;">Ellenbrook catchment</p> <p style="padding-left: 40px;">Other catchment (please name)</p> <p>3. Is the land to which the scheme applies the subject of any significant or potentially significant soil or land degradation issues, for example, salinity, waterlogging, erosion, acid sulphate soil?</p> <p style="padding-left: 20px;">If yes, identify issue/s: _____</p> | <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> |
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B. Pollution management

- | | |
|---|---|
| <p>4. Does the scheme allow for a land use that will or could discharge a significant quantity of a potential pollutant to the air, surface water, soil or groundwater?</p> | <p><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></p> |
|---|---|

If yes, please identify the land use/s, and associated pollutants:

NOTE: In this form, the term 'scheme' has the same meaning as in *Environmental Protection Act 1986*, and includes regional and town planning schemes and their amendments.

	Yes	No	Unsure
5. Does the scheme allow for a land use that could require a buffer over adjoining land? that is, does it allow for uses that may affect adjoining land (including land that may be used for future residential use) due to gases, noise, vibration, odours, light?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If yes, please identify land use/s, and off-site areas that may be affected:			
<hr/>			
What is the distance to the nearest residences?			
6. Would the scheme allow a residential area or sensitive land use (e.g. school) to be located in an area likely to be affected by emissions (e.g. gases, noise, odour) from industry, agriculture or infrastructure (e.g. landfill site)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If yes, please identify:			
<hr/>			
7. Does the scheme apply to a site that has been used for a past land use which may have contaminated the soil or groundwater, for example, market garden, industrial use, fill?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If yes, please identify:			
<hr/>			
8. Does the scheme apply to any land with a high watertable?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
C. Social surroundings			
9. Does the scheme raise any issues known to be of concern to the public?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If yes, is the concern to the public related to an environmental issue?			
Please specify the environmental issue(s) of concern			
<hr/>			
10. Is the scheme likely to raise heritage or cultural issues due to impacts on the biophysical environment?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If yes, please identify			
<hr/>			
11. Does the scheme apply to areas of land where there are existing or potential land uses associated with high levels of risk, for example, a high pressure gas pipe line, heavy industry	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
If yes, please identify:			
<hr/>			
D. Additional information			
<ul style="list-style-type: none"> • If all answers to the questions above are 'no', no other environmental information is required to accompany this checklist. • If answers include 'yes' or 'unsure', please provide information for those items on: <ul style="list-style-type: none"> o the existing environment o potential environmental impacts and their magnitude/significance o how the impacts will be managed to ensure a good environmental outcome. 			
The EPA will review the checklist and information submitted and if not sufficient for the EPA to decide whether or not to assess the scheme, the EPA may request additional information.			
Name of person completing form: _____ Date: _____			
Position: _____ Contact _____ Phone/Email: _____			

Spatial Data for Environmental Impact Assessment

About this document

This document describes the nature of boundaries required to be submitted as spatial data to the EPA as part of an environmental impact assessment.

What is spatial data?

Spatial data is digital information which can be used in computer mapping software; this information is also referred to as GIS or CAD data. If your organisation has GIS or CAD personnel; or your proposal has maps or engineering drawings, then you have spatial data.

Why are proposal boundaries required to be submitted to the EPA as spatial data?

The EPA values boundaries as spatial data and uses them to;

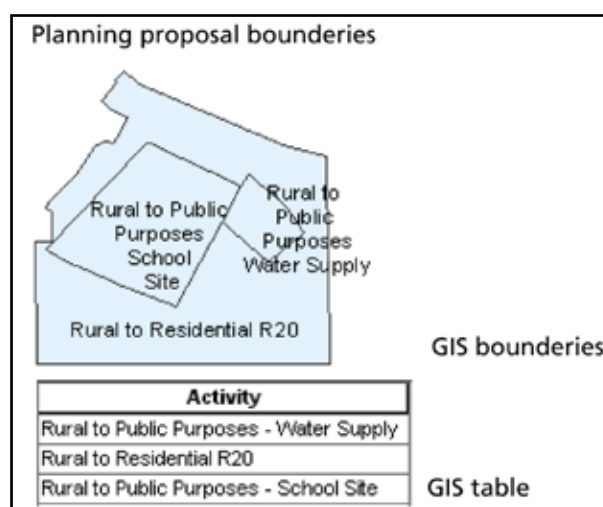
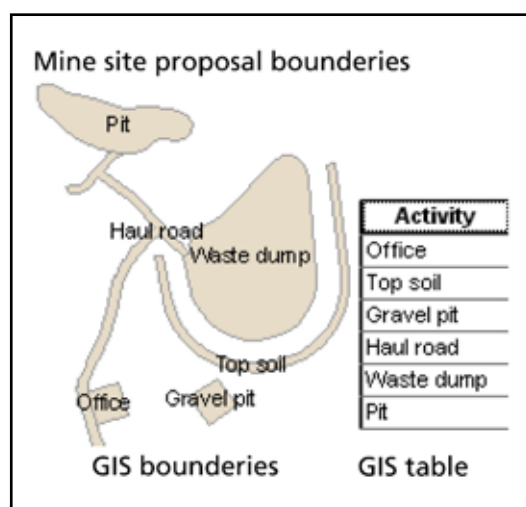
- i. find what environmental assets and issues are on or near the proposal
- ii. to serve as an administrative record
- iii. to communicate where the EPA has made decisions to others and their processes

What are the specifications required?

Proponents are required to submit GIS or CAD data on CD, depicting the proposal extent, geo-referenced and conforming to the following parameters:

- iv. datum: GDA94
- v. projection: Geographic (latitude/longitude) or Map Grid of Australia (MGA)
- vi. format: ESRI shapefile, geodatabase or coverage, Microstation or AutoCAD
- vii. where a series of activities are proposed, each should be individually mapped
- viii. each mapped boundary should be clearly labelled (CAD) or attributed (GIS)

Can you show me some examples?



Chapter A4

Environmental impact assessment of proposals

A4.1 TYPES OF PROPOSALS TO BE REFERRED TO THE EPA

The statutory procedures for the environmental impact assessment of proposals are set out in Divisions 1 and 2 of Part IV of the *Environmental Protection Act 1986* (EP Act). The referral and assessment procedures of Division 1 are informally known as the 'Section 38 process'.

Significant proposals must be referred to the Environmental Protection Authority (EPA) by a decision-making authority (s38 EP Act), except in some instances. These are outlined in A4.2.2.

Subdivision and development applications are types of proposals that may require referral by planning agencies to the EPA.

Structure plans do not usually fall within the definition of a significant proposal. They may, however, be strategic proposals which may be referred to the EPA by the proponent on a voluntary basis.

Regional and town planning schemes are not proposals under the EP Act and are assessed under a separate division of the Act (see Chapter A3).

A4.2 STEPS IN THE EIA PROCESS FOR PROPOSALS

To assist participants in land use planning and development, this section discusses

referral issues of relevance to planning, identifies the main levels of formal assessment, and provides introductory information on strategic environmental assessment of proposals.

A comprehensive outline of the environmental impact assessment process for proposals is not provided in this guidance statement since information is available on the internet www.epa.wa.gov.au and in published documents. The main guides to EPA procedures are listed in E2.4.

Appeals can be lodged at some stages of the environmental impact assessment process. Appeal procedures are set out in Part VII of the EP Act and are outlined in the website of the Appeals Convenor at www.appeals.dpc.wa.gov.au.

The latest procedures and legislative requirements should always be checked as changes occur from time to time.

TERMS

A **proposal** is defined in the *Environmental Protection Act 1986* (EP Act) as a 'project, plan, programme, policy, operation, undertaking or development or change in land use, or amendment of any of the foregoing, but does not include a scheme'.

The EP Act identifies the following types of proposals: significant proposals, strategic proposals, derived proposals, and proposals under an assessed scheme.

A **significant proposal** is one that is likely to have a significant effect on the environment.

A **strategic proposal** is a predecessor to a future proposal or proposals that if implemented would have a significant effect on the environment.

A **derived proposal** is a proposal referred under s38 EP Act that the EPA considers:

- was identified in a strategic proposal that has been assessed by the EPA, and
- after the EPA's report on the strategic proposal was published, it was agreed under s45 EP Act that the proposal could be implemented, or could be implemented subject to conditions (s39B EP Act).

A **proposal under an assessed scheme** is 'an application under the **assessed scheme** or an Act for the approval of any development or subdivision of any land within the area to which the assessed scheme applies' (s3 EP Act).

A **proponent** is the person, entity or public authority responsible for a proposal.

A **decision-making authority** is a public authority empowered to make a decision in respect of a proposal.

(see EP Act for full definitions)

A4.2.1 REFERRAL TO THE EPA

The key to the referral of a proposal to the EPA by a decision-making authority is the likelihood of a significant impact on the environment. Impacts that are considered environmentally significant will change with time as research proceeds, new issues arise and public concerns emerge. The EPA has developed overarching guidelines for environmental significance (A2.1).

In the first instance, the EPA expects that proponents and decision-making authorities will set out to achieve environmentally sustainable outcomes by identifying acceptable environmental standards, obtaining sufficient information to be able to fully consider environmental issues, and designing proposals to ensure that acceptable standards are met.

Where acceptable standards cannot be met, the decision-making authority should consider refusing the proposal rather than referring it to the EPA (A4.2.2 item 4).

In general, the responsibility to refer a proposal to the EPA rests with decision-making authorities. The Minister for the Environment, the proponent or any other person may also refer a proposal to the EPA if it has not already been referred. The referral of a proposal under an assessed scheme is subject to special provisions of the EP Act as outlined in A4.2.2, item 2.

Guidelines have been prepared to assist proponents and decision-making authorities to meet the referral requirements of the Act. These include *Environmental Impact Assessment Administrative Procedures 2002* (Government of Western Australia 2002a), the guidelines in this guidance statement, and the referral guides available on www.epa.wa.gov.au and from the EPA Service Unit Environmental Impact Assessment Division. The referral guides include:

- *EPA Referral Form (DMA)*
- *EPA Referral Form (Proponent)*
- General Guide for Referral of Proposals to the EPA
- *General Guide for State Government Departments and Local Authorities (as Decision-Making Authorities)*
- *Referral of a Subdivision or Development Proposal to the EPA by a Decision-Making Authority.*

The latter document is in Attachment A4-1 and presents guidelines specifically to assist planning authorities decide whether to refer a subdivision or development proposal to the EPA. It recommends procedures for planning agencies to follow when specific environmental factors are likely to be impacted. Figure A4 is a flow chart on procedures for decision-making authorities to follow when determining whether to refer a development or subdivision application to the EPA.

A4.2.2 PROPOSALS NOT USUALLY REFERRED TO THE EPA

1. A proposal that meets recognised environmental criteria

If the potential environmental impacts from a proposal can be managed by enforceable requirements to meet recognised environmental criteria and the guidelines in this guidance statement, referral of the proposal to the EPA is unlikely to be needed. Government agencies with expertise in particular aspects of environmental management may assist planning agencies in deciding whether recognised environmental criteria can be met through the planning process or other agency processes.

2. A proposal under an assessed scheme

Responsible authorities that are also decision-making authorities are required to comply with the special provisions in s48I EP Act that set out when they need to refer a proposal under an assessed scheme to the EPA.

When a proposal under an assessed scheme that appears likely, if implemented, to have a significant effect on the environment comes to the notice of a responsible authority, the responsible authority is required to determine whether or not:

- the environmental issues were 'assessed in any assessment of the assessed scheme' (s48I(2) (a) EP Act)
- the proposal complies with the assessed scheme and any conditions to which the assessed scheme is subject.

The responsible authority does not need to refer the proposal to the EPA if it determines that the issues were assessed and the proposal complies.

If the environmental issues were not assessed and/or the proposal does not comply with the assessed scheme, the proposal should be referred to the EPA by the responsible authority (in its capacity as a decision-making authority) together with evidence of the s48I determination.

A proposal under an assessed scheme is also subject to the following referral provisions:

- a decision-making authority that is not the responsible authority will need to refer the proposal to the EPA
- the proponent may refer the proposal to the EPA
- the Minister for the Environment may refer the proposal to the EPA
- the EPA may call in the proposal in certain circumstances.

3. A previously referred proposal

A proposal that has previously been referred to the EPA cannot be referred again unless its assessment was terminated under s40A EP Act. Thus a decision-making authority does not need to refer a significant proposal if it has already been referred, for example, by the proponent.

4. A proposal that will be refused by the decision-making authority

If a decision-making authority will refuse to grant approval for a proposal, its referral to the EPA is not required. However, if the decision-making authority's decision is appealed, referral of the proposal to the EPA may be appropriate, if its implementation is likely to have a significant effect on the environment.

5. A proposal that has already been implemented

A development that has been implemented or substantially implemented is not considered to be subject to the environmental impact assessment process.

6. A proposal that will be the subject of an amendment

Sometimes a significant proposal arises that is prohibited under a planning scheme but is, or is soon likely to be, the subject of an amendment to the scheme. The EPA Service Unit should be approached for advice on whether to refer these proposals to the EPA. In some instances, referral to the EPA is not indicated, taking into account that a decision-making authority cannot approve the use or development under a relevant scheme, and the amendment must be referred to the EPA. However, the EPA may identify advantages in assessing the proposal rather than the amendment, or possibly even both, to ensure a satisfactory environmental outcome.

If there is uncertainty about the need to refer a subdivision or development proposal to the EPA, contact the EPA Service Unit's Environmental Impact Assessment Division.

The flow chart sets out procedures recommended by the EPA to assist a decision-making authority (DMA) that is also the responsible authority to decide whether to refer a planning proposal to the EPA, and to achieve good environmental outcomes

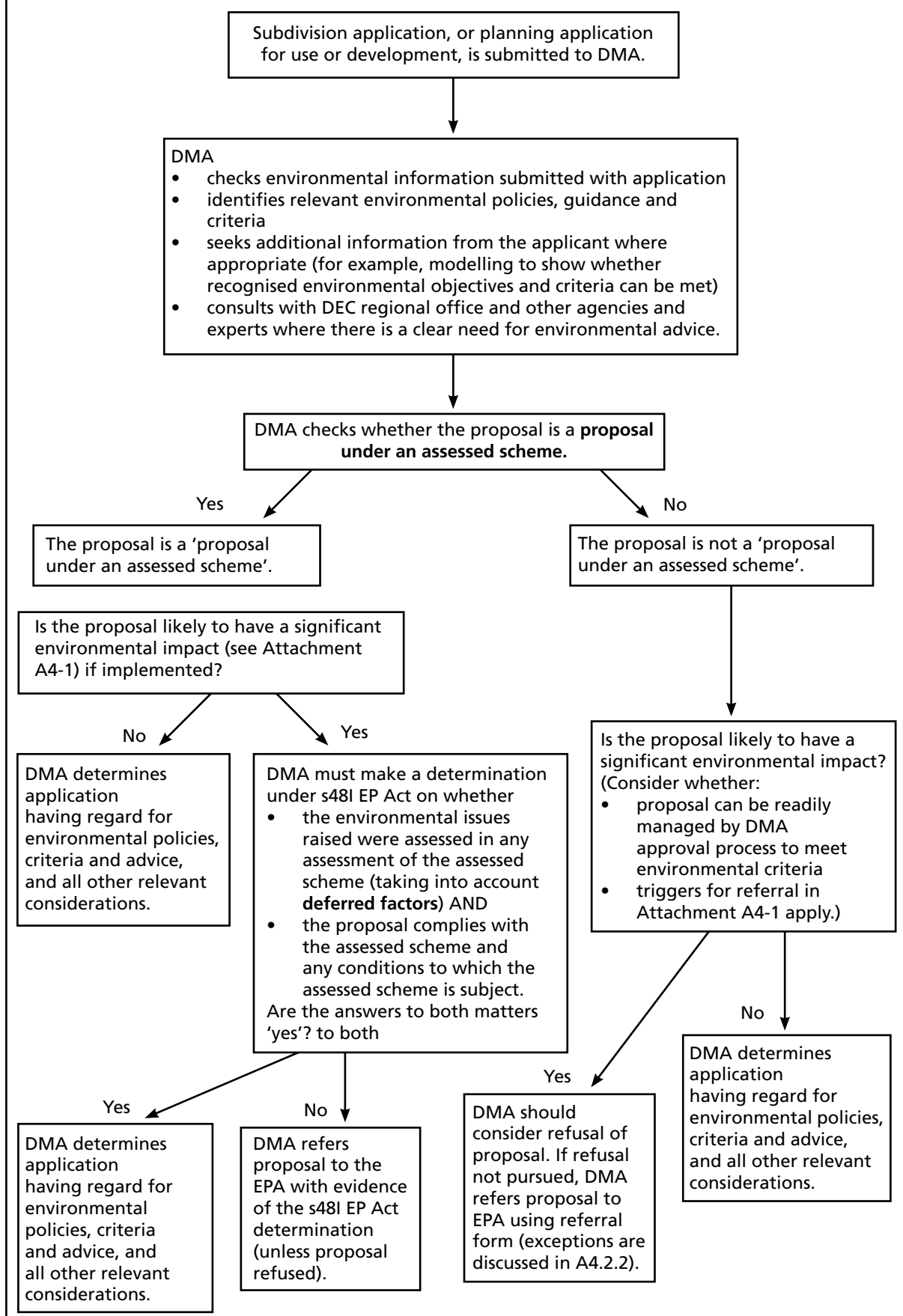


Figure A4. Procedures to assist DMAs decide whether to refer a development or subdivision application to the EPA

A4.2.3 INFORMATION TO ACCOMPANY A PROPOSAL REFERRED TO THE EPA

It is advisable for referrers to use the EPA forms to clearly identify a referral under s38 of the EP Act, and to assist them to provide appropriate information. Forms are available on www.epa.wa.gov.au or from the EPA Service Unit Environmental Impact Assessment Division.

The information to be submitted depends on whether the referrer is the proponent, a decision-making authority or other entity. If the information submitted by the referrer is insufficient, the EPA will require further information from an appropriate source.

Adequate information is essential to enable the EPA to set the level of assessment, or to declare a referred proposal to be a derived proposal (see A4.2.4). The 28-day period that the EPA has to set the level of assessment is not regarded as having begun until all requests for information have been met to the EPA's satisfaction (s38A EP Act).

As a general guide, information is required on:

- the proposal
- the proponent
- the environmental factors and issues potentially impacted should the proposal be implemented
- the characteristics of the existing environment and its significance
- the likely environmental impacts
- relevant studies and modelling already carried out and to be carried out
- how each impact will be managed so as to ensure protection of the environment
- comments from government authorities on the proposal, and the names of any other authorities to be consulted
- identification of all required approvals
- a summary of any public consultation carried out
- sufficient map detail and cadastral information to enable the EPA to readily and precisely locate the proposal, and diagrams and other information that clarifies what is proposed.

Parts B to D of this guidance statement provide additional advice on the type of information that assists the EPA to set the level of assessment when particular environmental factors are likely to be affected.

A4.2.4 ASSESSMENT OF PROPOSALS

The EPA may decide to assess or not assess a referred proposal.

If the EPA decides not to assess a proposal, it may provide non-binding advice. Where other regulatory controls will be applied to manage environmental impacts, the EPA does not usually apply the formal environmental impact assessment process.

If the EPA decides to assess a proposal, it generally adopts one of the levels below. However, variations are possible as the EP Act provides scope for the EPA to tailor the form, content, timing and procedures of any environmental review required of the proponent. Where a proposal is assessed under the Act, this is commonly known as formal assessment.

The levels of assessment described by the EPA are:

1. Assessment on Referral Information (ARI)
2. Proposal Unlikely to be Environmentally Acceptable (PUEA)
3. Environmental Protection Statement (EPS)
4. Public Environmental Review (PER)
5. Environmental Review and Management Programme (ERMP)
6. Strategic Environmental Assessment (SEA).

The assessment processes for the first five levels of assessment are set out in the Environmental Impact Assessment (Part IV Division 1) Administrative Procedures 2002 and are not described in detail here. Flow charts for these processes are in Attachments A4-3 to A4-6. Strategic Environmental Assessment is discussed below.

Examples of proposals that have been formally assessed:

- proposals that affect an area with identified high environmental values such as an existing conservation reserve, an area identified in the EPA's Conservation Through Reserves (Red Books) reports, or a conservation category wetland
- proposals that result in significant emissions impacting off-site which may exceed accepted standards
- proposals with environmental impacts that are the subject of significant public concern
- major infrastructure projects, such as roads, airports, waste water disposal facilities, water supply and irrigation developments
- significant contaminated sites
- major marine and coastal developments, such as ports and marina developments
- major industrial projects such as liquefied natural gas plants.

Strategic Environmental Assessment

The assessment of a strategic proposal is known as Strategic Environmental Assessment (SEA). Amendments to the EP Act introduced in 2003 enable the EPA to assess strategic proposals.

As for other types of proposals, a strategic proposal in Western Australia encompasses a project, plan, program, policy, operation, undertaking or development or change in land use. However, the concept of a strategic proposal covers proposals that are relatively conceptual or which encompass a range of significant proposals to be progressed over time. A strategic proposal is more likely to be a plan, program or policy, than an operation, undertaking or development. A proposed change in land use could be either a strategic or significant proposal, or be subject to scheme assessment procedures.

Under s37B(2) EP Act:

'A proposal is a "strategic proposal" if and to the extent to which it identifies:

- a) a future proposal that will be a significant proposal; or
- b) future proposals likely, if implemented in combination with each other, to have a significant effect on the environment.'

Examples of strategic proposals may include land use planning strategies, drilling programs or satellite mining developments.

It is expected that referral will usually be by the proponent, on a voluntary basis.

The EPA has flexibility in determining the assessment procedures which will vary depending on the complexity and type of the strategic proposal, and the significance of potential impacts. Where the strategic proposal raises complex issues but is well-defined and capable of implementation, the EPA expects to adopt an assessment process consistent with Environmental Review and Management Program as outlined in the Environmental Impact Assessment Administrative Procedures 2002 (Government of Western Australia 2002a).

The EPA is currently trialling the assessment of strategic proposals under a philosophy of continuous improvement before publishing detailed guidelines.

Derived proposals

Proposals that derive from strategic proposals are subject to special provisions in the EP Act. If a proposal that is referred to the EPA is declared to be a derived proposal, the EPA is not to assess the proposal although it may conduct an enquiry into whether the implementation conditions relating to the proposal should be changed.

Attachment A4-1

Referral of a subdivision or a development proposal to the EPA-Indicators of need to refer

DMA REFERRAL
OF A SUBDIVISION
OR DEVELOPMENT
PROPOSAL



Environmental Protection Authority

Referral of a subdivision or development proposal to the Environmental Protection Authority by a decision-making authority under section 38 of the *Environmental Protection Act 1986*

PURPOSE OF THIS GUIDE

The following guide has been prepared primarily to assist planning authorities decide whether to refer a subdivision or development proposal to the EPA for the EPA to decide the level of environmental assessment. The guide will also assist other agencies that see subdivision or development applications.

The *Environmental Protection Act 1986* (EP Act) requires that a planning authority, as a decision-making authority (DMA), must refer a significant proposal to the EPA for a decision on whether the proposal should be subject to environmental impact assessment. A significant proposal is one that is likely if implemented to have a significant effect on the environment.

Some exceptions exist as outlined below.

Proponents and others may also refer a proposal to the EPA in specified instances.

A general guide to the EPA's concept of environmental significance is in the *Environmental Impact Assessment (Part IV Division 1) Administrative Procedures 2002* (available on www.epa.wa.gov.au).

A proposal does not need to be referred to the EPA by a DMA in the following cases:

- the proposal has already been referred to the EPA
- in relation to a proposal under an assessed scheme*, the DMA is also the responsible authority for the scheme AND has determined that the proposal is consistent with the assessed scheme and any environmental conditions set on the assessed scheme AND does not raise significant new environmental issues (including issues identified as deferred factors by the EPA)
- the decision-making authority will apply conditions that ensure that the proposal meets recognised environmental criteria including the EPA's objectives and criteria as set out in documents published by the EPA, for example, Guidance and Position Statements
- the decision-making authority will refuse the proposal. Referral may be appropriate if a refusal is appealed.

In the first instance, the EPA expects that proponents will liaise with the appropriate State and Local Government authorities regarding the impacts of their proposals to see whether the environmental impacts can be managed through the design of the proposal and conditions imposed by those authorities to meet recognised environmental criteria.

Generally, referral to the EPA of a proposal should be considered if:

- indicated in the tables below; or
- the proposal in any other way not listed may have a significant impact on the environment.

If considering a referral, please check the DMA Referral Guide: *General Guide for State Government Departments and Local Authorities*. If making a referral, please use the appropriate referral form. These are available on www.epa.wa.gov.au or from the Environmental Impact Assessment Division on 6364 6500.

* A proposal under an assessed scheme means 'an application under the assessed scheme or an Act for the approval of any development or subdivision of any land within the area to which the assessed scheme applies' (section 3 EP Act). Usually, an assessed scheme will be a planning scheme or planning scheme amendment that has been referred to the EPA and is the subject of a level of assessment set by the EPA as 'not assessed', or a statement of environmental conditions set by the Minister for the Environment following the formal environmental impact assessment process. An assessed scheme may also be a scheme that is required to be made following an amendment to a regional scheme where the amendment to the regional scheme is itself an assessed scheme. An assessed scheme is defined in section 3 of the EP Act.

When a DMA that is also the responsible authority refers a proposal under an assessed scheme to the EPA, it is requested to provide evidence of the determination it is required to make as the responsible authority under s481 EP Act.

Indicators for the referral of a subdivision or development proposal to the EPA by planning authorities (as DMAs)

- These indicators should be read in conjunction with the EPA's Referral Guide *General Guide for State Government Departments and Local Authorities: Referral of Proposals to the EPA under Section 38(1) of the Environmental Protection Act 1986*. The indicators provide supplementary considerations and procedures to assist agencies determine whether a referral should be made to the EPA when specific environmental factors are likely to be impacted.
- A proposal does not need to be referred in the cases listed on the preceding page.
- In other cases, referral by a planning authority (as a decision-making authority) **should be made** when:
 - the proposal impacts on the environment as stated in the first column **AND**
 - after following the pre-referral steps in the second column, referral is indicated.

1 Native vegetation and fauna

IMPORTANT NOTE: Where natural areas and/or native fauna are likely to be disturbed by either direct or indirect impacts, planning agencies, where they can take these factors into account, are encouraged to ensure that adequate information is first obtained to determine the characteristics and significance of the natural areas and fauna. Guidelines for flora, vegetation and fauna surveys are provided in EPA Guidances 51, 56 and 33. The level of detail required will clearly vary depending on the circumstances. Basic information should usually include at least the following: vegetation mapping using recognised classification systems (mapping should enable comparisons with regional mapping); species; the significance of the vegetation (using recognised criteria); any threatened and poorly reserved ecological communities; significant flora and fauna; fauna habitat areas; vegetation condition; and vegetation values and functions.

Proposal is likely to impact on these categories	Pre-referral steps and referral indicators
Land recommended for protection in EPA Conservation Reserves for Western Australia reports* (other than in Perth Bush Forever area and in other areas where the above recommendations are superseded by later recommendations endorsed by government)	First obtain information (see note above) and the comments of key agencies (DEC and other relevant agencies with natural resource expertise). Consider referral if key agencies or experts have significant concerns that are not likely to be addressed through planning, DEC clearing permit or other agency processes.
Bush Forever site (Perth metropolitan area on Swan Coastal Plain)	First aim to satisfy Bush Forever procedures. Consider referral if EPA Guidance 10 indicates, and accompany a referral with the advice of the Bush Forever (BF) Office (normally proposal referred by BF Office to EPA).
Regional Open Space or proposed Regional Open Space in Greater Bunbury Region Scheme or Peel Region Scheme area	First obtain the comments of key agencies with natural resource expertise. Consider referral if key agencies or experts have significant concerns that are not likely to be addressed through planning, DEC clearing permit or other agency processes.
National Park, Conservation Park or other reserve for the conservation of flora and fauna	First obtain information (see note above) and the comments of DEC/ Conservation Commission and other relevant agencies with natural resource expertise. Consider referral if these agencies or experts have significant concerns that are not likely to be addressed through planning, DEC clearing permit or other agency processes.
Land recommended by DEC for inclusion in the conservation estate	First obtain information (see note above) and the comments of DEC/ Conservation Commission and other relevant agencies with natural resource expertise. Consider referral if these agencies or experts have significant concerns that are not likely to be addressed through planning, DEC clearing permit or other agency processes.

Known threatened ecological community	First obtain the comments of DEC. Consider referral if DEC or expert has significant concerns that are not likely to be addressed through planning, DEC clearing permit or other agency processes.
Any other bushland not in Perth Bush Forever study area (Swan Coastal Plain portion of metropolitan area), the Greater Bunbury Region Scheme or Peel Region Scheme area.	First obtain information (see note above) on the attributes and significance of the bushland and fauna habitat, and the comments of DEC and/or other relevant agencies, for example, DEC. Consider referral if these agencies or experts have significant concerns that are not likely to be addressed through planning, DEC clearing permit, or other agency processes. (Note: Declared Rare Flora is usually addressed by <i>Wildlife Conservation Act 1950</i>).
Any other bushland in the Perth Bush Forever study area (Swan Coastal Plain portion of metropolitan area) but not in a Bush Forever site Any other bushland in the Greater Bunbury Region Scheme or Peel Region Scheme area but not in Regional Open Space.	First, obtain information on the likelihood of threatened ecological communities, significant flora and fauna, threatened fauna habitat and ecological communities of which less than 10% remain. If likely to be present, obtain the comments of DEC and other relevant agencies with natural resource expertise. Consider referral if agencies or experts have significant concerns that are not likely to be addressed through agency approval processes (Note: Declared Rare Flora is usually addressed by <i>Wildlife Conservation Act 1950</i>)
Habitat of the Western Swamp Tortoise (shown in the <i>Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002</i>)	First endeavour to comply with the <i>Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002</i> in consultation with DEC. Consider referral if relevant agencies or experts have concerns that are not likely to be addressed through agency approval processes.

* See EPA Reports on Conservation Reserves for Western Australia for the 12 areas of the State (termed 'Systems') and published in 1975 (Systems 4, 8-12), 1976 (Systems 1, 2, 3, 5), 1980 (System 7) and 1983 (System 6). These reports were published with red covers and are sometimes called the 'Red Books'. Note that the Red Book recommendations apply except where superseded by later conservation recommendations endorsed by government.

2 Wetlands, water bodies, watercourses, inlets, estuaries, coast

Proposal is likely to impact on these categories	Pre-referral steps and referral indicators
A water body that is subject to the <i>Environmental Protection (Swan Coastal Plain Lakes) Policy 1992</i>	Refer if direct impacts on wetland from filling, excavating or draining into or out of the water body. Accompany referral with the comments of DEC.
A wetland that is subject to the <i>Environmental Protection (South West Agricultural Zone Wetlands) Policy 1997</i>	Refer if the following is proposed: filling, excavating or draining into (or out of Crown land), or some types of damaging or clearing of native vegetation, or construction or alteration of prescribed drainage systems. Accompany referral with the comments of DEC.
A wetland, water body, watercourse, estuary, inlet or coastal land to which international agreements apply, because of importance for waterbirds and waterbird habitats (Ramsar, JAMBA, CAMBA)	First obtain information on the water body and fauna and potential impacts, and the comments of DEC and other relevant agencies with natural resource expertise, for example, DoE. Consider referral if these agencies or experts raise significant concerns that are not likely to be addressed through planning or other agency processes.
Conservation category wetland and buffers	First obtain information on the wetland, its buffer and potential impacts, and the comments of DEC and other relevant agencies with natural resource expertise (for example, Swan River Trust). Consider referral if these agencies or experts raise significant concerns that are not likely to be addressed through planning or other agency processes.

Other wetlands in areas where management category has not been mapped by DEC but site studies indicate conservation management category	First obtain information on the wetland, its buffer and potential impacts, and the comments of DEC and other relevant agencies with natural resource expertise. Consider referral if these agencies or experts raise significant concerns that are not likely to be addressed through planning or other agency processes.
Estuary, inlet or coastal land, or the foreshore of these and major new development proposed, for example, marina, canal development, port, aquaculture	First obtain information on site characteristics and potential impacts, and the comments of relevant agencies with natural resource expertise, for example, DEC. Consider referral if agency or experts have significant concerns that are not likely to be addressed through planning or other agency processes.
Major waterways and their foreshores and major new development proposed	As above

3 Public drinking water sources

The proposal is in:	Pre-referral steps and referral indicators
An existing or proposed Public Drinking Water Supply Area (PDWSA) and the proposal is inconsistent with DoW land use compatibility table for PDWSAs	First obtain comments of DoW. Consider referral if DoW or expert has significant concerns that are not likely to be addressed through planning or other agency processes.
A catchment that supplies public drinking water and the proposal is outside a proclaimed PDWSA	First obtain information on potential impacts, and the comments of DoW. Consider referral if DoW or expert has significant concerns that are not likely to be addressed through planning or other agency processes.

4 Soil and catchment issues

Proposal characteristic	Pre-referral steps and referral indicators
Subdivision or development may disturb acid sulfate soils.	First follow procedures in DPI Planning Bulletin on Acid Sulfate Soils, and obtain comments of DEC as guided by the Bulletin. Consider referral if significant DEC /expert concerns (i.e. major development or difficult to manage)
Major subdivision or development that has the potential to contribute to significant land or water degradation (for example, salinity, eutrophication)	First obtain information on site characteristics and potential impacts, and the comments of DEC and/or other relevant agencies with natural resource expertise. Consider referral if above agencies or experts have significant concerns that are not likely to be addressed through planning or other agency processes.

5 Contamination

Proposal characteristic	Pre-referral steps, and referral indicators
Subdivision or development proposed on land with major soil or groundwater contamination	First obtain the results of site investigations carried out in accordance with DEC guidelines (on internet), and the comments of DEC if acceptable criteria are exceeded. Consider referral if significant agency/expert concerns are not likely to be addressed through planning or other agency processes (for example, contamination likely to be difficult to manage).

Subdivision or development is to accommodate a use that has the potential to cause major soil or groundwater contamination	First obtain technical information on site characteristics and potential impacts, and the comments of DEC and other relevant agencies. Consider referral only if there are significant agency/expert concerns that are not likely to be addressed through DEC licensing or other agency processes.
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6 Infrastructure, industry and activities associated with off-site noise, air emissions and/or other pollution impacts

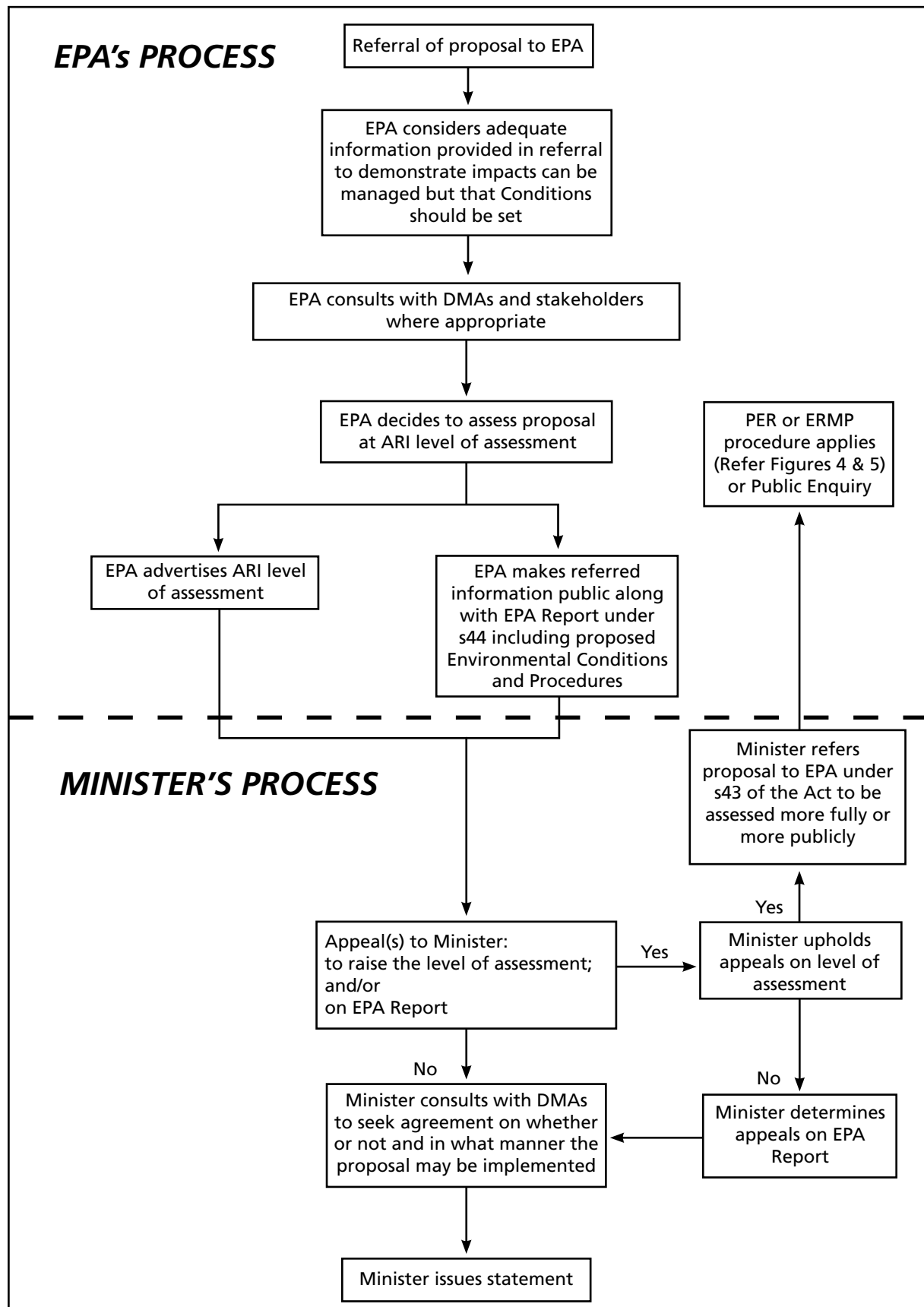
Proposal characteristic	Pre-referral steps and referral indicators
Major development that has the potential to cause off-site pollution impacts that exceed recognised criteria. Examples may include: <ul style="list-style-type: none"> • airport • major road • railway • major waste water treatment plant • power station • major mineral and gas refining projects • port • marina 	Usually, first obtain information on site characteristics and potential emissions, and the comments of DEC and relevant agencies that regulate emissions. Consider referral if DEC, planning and other agency processes cannot ensure all recognised criteria for emissions are met, or if in any other way the above agencies have significant concerns.
Major irrigation project or intensive primary production, for example, aquaculture	First obtain information on site characteristics and potential emissions, and the comments of DEC and other relevant agencies that regulate emissions. Consider referral if significant agency/expert concerns that are not likely to be addressed through planning, DEC or other agency processes.

7 Sites of heritage, cultural or social significance

Proposal characteristic	Pre-referral steps and referral indicators
Subdivision or development has the potential to impact on a site of high heritage, cultural, or social significance, including landforms of high cultural, aesthetic or scientific value, for example, a major ridgeline or escarpment.	First obtain information on site characteristics and potential impacts, and the comments of relevant agencies, for example, Department of Indigenous Affairs, Heritage Council of Western Australia, Swan River Trust, DEC. Consider referral if above agencies have significant concerns that are not likely to be addressed through planning, heritage or other agency processes.

Attachment A4-2

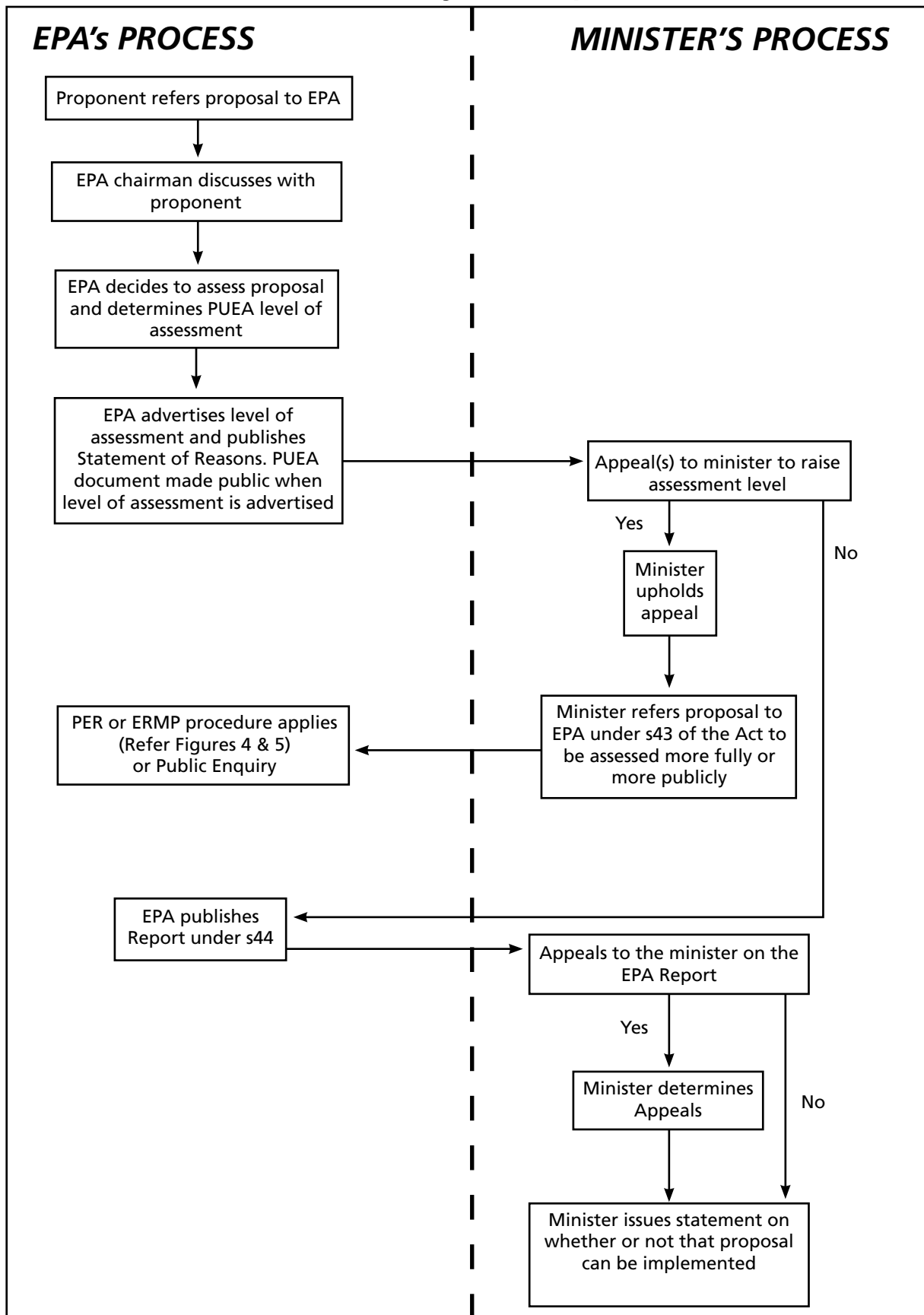
Outline of Procedure for Assessment on Referral Information (ARI)



Adapted from Government of Western Australia (2002a)

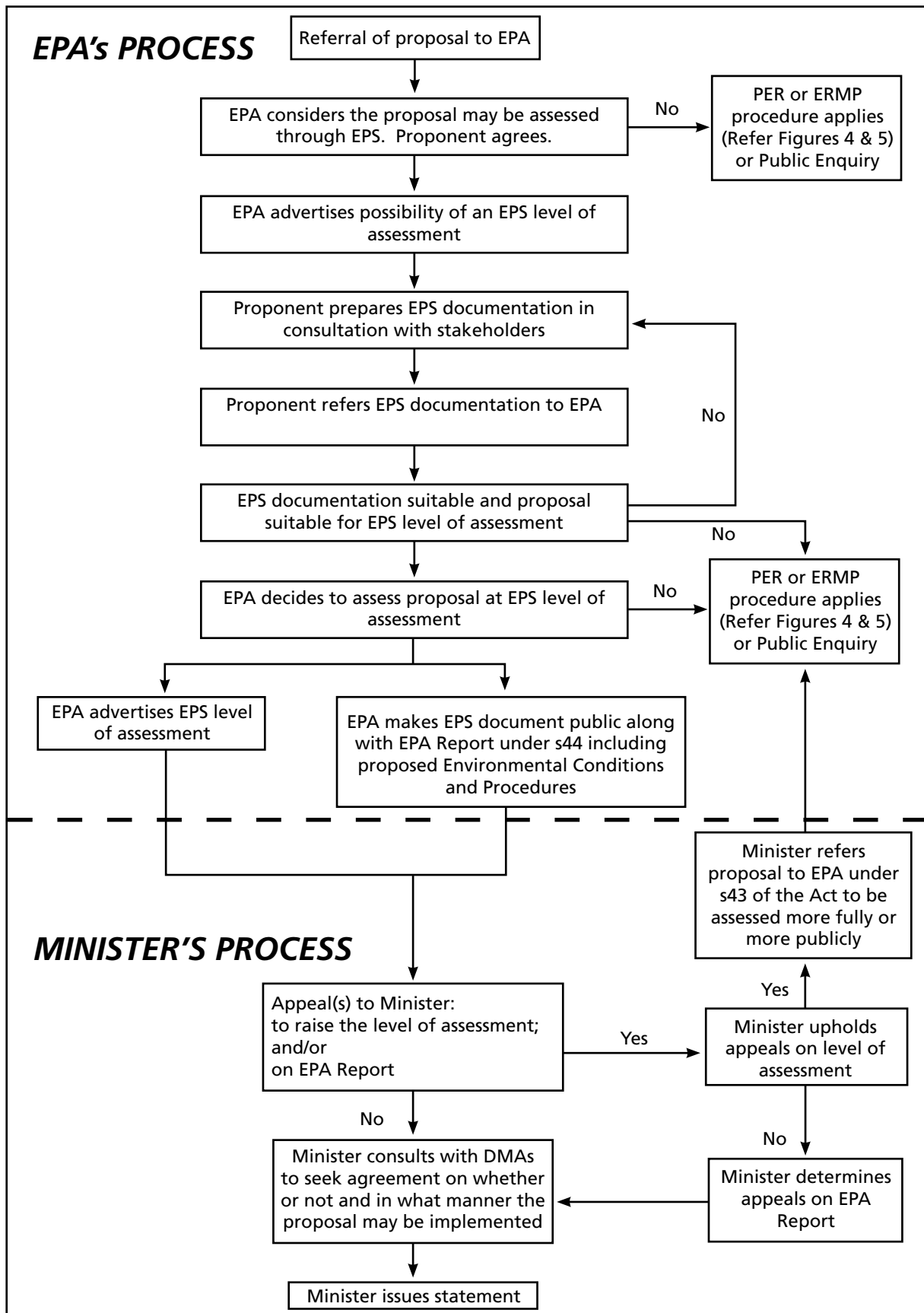
Attachment A4-3

Outline of Procedure for Proposal Unlikely to be Environmentally Acceptable (PUEA)



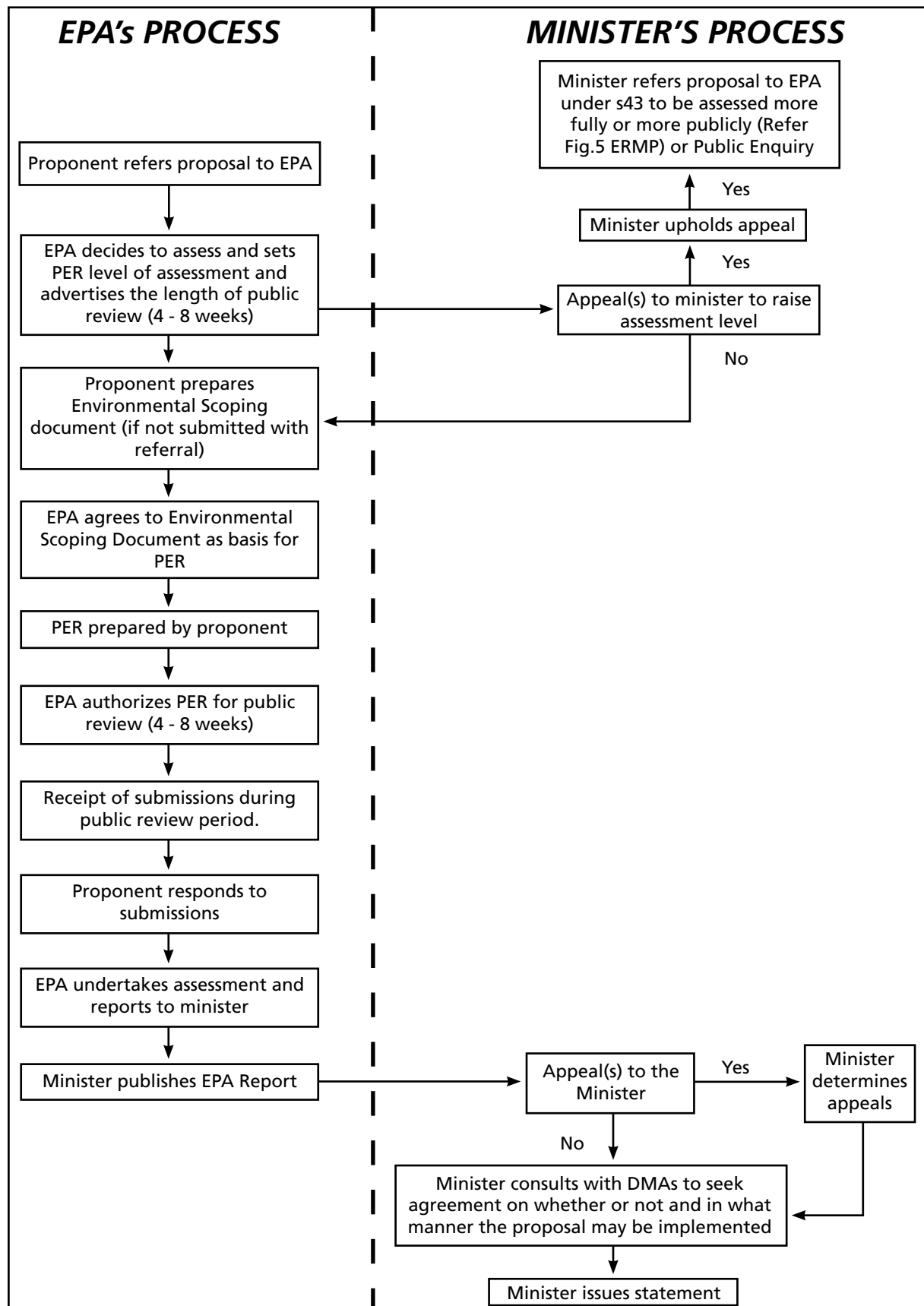
Adapted from Government of Western Australia (2002a)

Outline of Procedure for Environmental Protection Statement (EPS)



Adapted from Government of Western Australia (2002a)

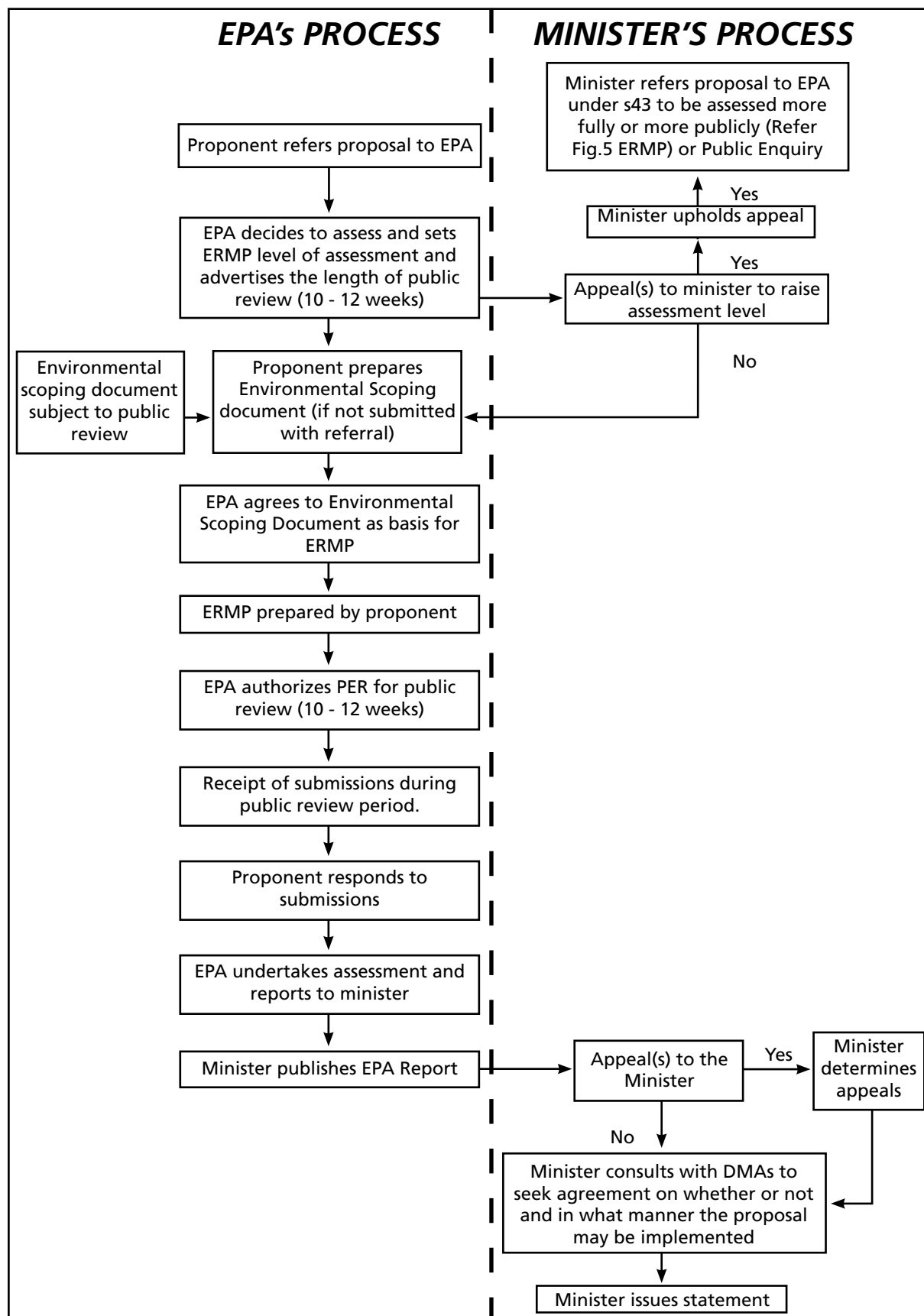
Outline of Procedure for Public Environmental Review (PER)



Adapted from Government of Western Australia (2002a)

Attachment A4-6

Outline of Procedure for Public Environmental Review and Management Programme (ERMP)



Adapted from Government of Western Australia (2002a)



**Environmental
Protection Authority**

Environmental Guidance for Planning and Development

Part B

Biophysical factors

Part B

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Biophysical factors

Part B of this guidance statement provides the advice of the Environmental Protection Authority (EPA) on a range of biophysical factors to assist participants in land use planning and development to meet the EPA's objectives for environmental protection.

- Biodiversity and significant natural areas – Chapter B1
- Native terrestrial vegetation – Chapter B2
- Native terrestrial fauna – Chapter B3
- Wetlands – Chapter B4
- Waterways – Chapter B5
- Public drinking water sources – Chapter B6
- Land degradation – Chapter B7
- Landscape and landforms – Chapter B8
- Karst, subterranean wetlands and fauna – Chapter B9

Chapter B1 discusses two issues, biodiversity conservation and the identification of natural areas to be given a high level of ecological protection.

Chapters B2 to B9 provide information and advice on particular biophysical factors under the following headings:

Significance of the factor: Background information on the factor including important issues.

EPA's broad principles for the protection of the factor: The EPA's objective for the factor, the key principles that the EPA applies to protect the factor, the EPA's published position and areas of high conservation significance.

Considering the factor during planning: Advice to assist land use planning and development at the broad scale (strategic and structure planning, regional schemes, town planning schemes) and at the local level (subdivisions, developments, detailed local structure plans and town planning scheme requirements).

Referral to the EPA: Information that assists the EPA to set the level of assessment on a referred scheme or proposal, and advice on when referral of a proposal to the EPA should be considered.

Attachments: Supplementary information at the end of some chapters.

POLICY AND REGULATORY OVERVIEW FOR BIOPHYSICAL FACTORS

Table B1 outlines key agencies, strategies and policies in relation to the biophysical factors discussed in Part B to assist the integration of environmental protection and land use planning.

- For more information, see the following sections:
- introductory information on agency roles – Table A1
- overarching environmental strategies and policies, for example, *The Western Australian State Sustainability Strategy* – section A1.3.1
- publications of the EPA, Department of Environment and Conservation (DEC) and other agencies – Part E
- references for State Planning Policy (SPP) of the Western Australian Planning Commission (WAPC) – section E1. Gazetted SPPs are in the Government of Western Australia listing and draft SPPs are in the Western Australian Planning Commission (WAPC) listing.

Table B1. Biophysical factors: Key agencies, strategies, initiatives and state planning policy

BIOPHYSICAL FACTORS	AGENCIES	GOVERNMENT STRATEGIES, AGREEMENTS	OTHER KEY INITIATIVES	STATE PLANNING POLICY (SPP) PURSUANT TO S26 PLANNING AND DEVELOPMENT ACT 2005 (SEE www.wapc.wa.gov.au)
Biodiversity (Chapter B1) Native terrestrial vegetation (Chapter B2) Native terrestrial fauna (Chapter B3)	DEC EPA Department of Fisheries DEWHA (Commonwealth) Planning agencies Government land and water managers	Many strategies in A1.3.1 are relevant.	Natural Heritage Trust and Natural Resource Management initiatives Preliminary Agency Statement of Natural Resource Management Priorities in Western Australia (Department of Agriculture et al. 2003) Ecological Management Understanding Process (www.emuproject.org)	
Wetlands (Chapter B4)	DEC EPA DEWHA (Commonwealth) Planning agencies Government land and water managers Department of Health (disease vector mosquitoes) Department of Fisheries	Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar 1971) Wetlands Policy of the Commonwealth Government of Australia (1997) Wetlands Conservation Policy for Western Australia (1997) National Water Quality Management Strategy (introduced 1992) State Water Quality Management Strategy (introduced 2001) State Water Strategy (2003) Japan–Australia Migratory Birds Agreement (1974) China–Australia Migratory Birds Agreement (1986)	Natural Heritage Trust and Natural Resource Management initiatives	SPP No. 2.9 Water Resources

BIOPHYSICAL FACTORS	AGENCIES	GOVERNMENT STRATEGIES, AGREEMENTS	OTHER KEY INITIATIVES	TATE PLANNING POLICY (SPP) PURSUANT TO S26 PLANNING AND DEVELOPMENT ACT 2005 (SEE www.wapc.wa.gov.au)
Waterways (Chapter B5)	DoW Swan River Trust EPA DEWHA (Commonwealth) Planning agencies Government land and water managers Department of Health (disease vector mosquitoes) Department of Fisheries Regional catchment groups (see Land degradation below) Subregional catchment groups	National Water Quality Management Strategy (introduced 1992) State Water Quality Management Strategy (introduced 2001) State Water Strategy (2003) Framework for Floodplain Management in Western Australia (1998) Convention on Wetlands of International Importance, especially as Waterfowl Habitat (Ramsar 1971) Japan–Australia Migratory Birds Agreement (1974) China–Australia Migratory Birds Agreement (1986)	Natural Heritage Trust and Natural Resource Management initiatives Waterways WA Program (see www.environment.wa.gov.au)	Salinity management initiatives (for example, Water Resource Recovery Catchments (www.environment.wa.gov.au) Catchment management initiatives and plans, for example, Riverplan: An Environmental Management Framework for the Swan and Canning Rivers (Government of Western Australia 2004c)
Public drinking water sources (Chapter B6)	DoW EPA Department of Health Planning agencies Water service providers, for example, Water Corporation, Aquwest, Busselton Water Board	National Water Quality Management Strategy (including Australian Drinking Water Guidelines 2004) State Water Quality Management Strategy (2001) State Water Strategy (2003)	Land use and water management strategies, for example, Gnamagara Land Use and Water Management Strategy (WAPC 2001)	SPP No. 2.2 Gnamagara Mound Crown Land Policy

BIOPHYSICAL FACTORS	AGENCIES	GOVERNMENT STRATEGIES, AGREEMENTS	OTHER KEY INITIATIVES	TATE PLANNING POLICY (SPP) PURSUANT TO S26 PLANNING AND DEVELOPMENT ACT 2005 (SEE www.wapc.wa.gov.au)
Land degradation (Chapter B7)	Department of Agriculture DEC EPA Planning agencies Local government Natural Resource Management Council Swan Catchment Council Avon Catchment Council South Coast Regional Initiative Planning Team Northern Agricultural Catchments Council Rangelands Regional Assessment Panel South West Catchments Council Subregional catchment groups	State Salinity Strategy (2000) Western Australian Government Framework to Assist in Achieving Sustainable Natural Resource Management in Western Australia (WRC et al. 1999) Preliminary Agency Statement of Natural Resource Management Priorities in Western Australia (Department of Agriculture et al. 2003)	Natural Heritage Trust and Natural Resource Management initiatives Water Resource Recovery Catchments (www.environment.wa.gov.au)	Other catchment management and land care group initiatives
Landscape and landforms (Chapter B8)	Planning agencies DEC EPA Department of Agriculture Government land and water managers DEWHA (Commonwealth) Infrastructure providers (for example, Main Roads Western Australia)		Ecological Management Understanding Process (www.emuproject.org)	SPP No. 2 Environment and Natural Resources Policy

BIOPHYSICAL FACTORS	AGENCIES	GOVERNMENT STRATEGIES, AGREEMENTS	OTHER KEY INITIATIVES	ATE PLANNING POLICY (SPP) PURSUANT TO S26 PLANNING AND DEVELOPMENT ACT 2005 (SEE www.wapc.wa.gov.au)
Karst, subterranean wetlands and fauna (Chapter B9)	DEC EPA Planning agencies DEWHA (Commonwealth) Government land and water managers		Sources of expert knowledge include: universities speleological experts and groups (WA Speleological Group, Speleological Research Group of WA, Cavers Leeuwini, Australian Speleological Federation, Australasian Cave and Karst Management Association) geotechnical experts specialist environmental scientists	SPP No. 2 Environment and Natural Resources Policy

¹ See the Acronyms list at the beginning of this guidance statement

Chapter B1

Biodiversity and significant natural areas

Chapter B1 discusses two important issues that embrace a number of the environmental factors that are addressed in more detail in the following chapters of Part B. These issues are biodiversity conservation (B1.1) and the identification of natural areas to be given a high level of ecological protection (B1.2).

B1.1 BIODIVERSITY CONSERVATION

This section outlines the significance of biodiversity, and the broad principles of the Environmental Protection Authority (EPA) for biodiversity conservation.

Maintaining biodiversity is a key global, national, state and local issue and is essential for a number of reasons. Living things (on land, in freshwater and marine environments, in the soil and in the air) contribute to the essential **ecosystem processes** that make life possible. These processes include maintaining the quality of water and regulating ground and surface water flows, **nutrient** storage and cycling, pollutant breakdown and absorption, climatic and atmospheric regulation, biological control of pest species, soil production and control of erosion.

- Species and genetic variability
- provides a basis for evolution and adapting to changing environments.
- The degradation of ecological systems associated with the loss of living things is difficult and expensive to reverse. In many cases repair is not possible to achieve, leaving land, soil, air and water environments that support fewer life forms.
- An environment rich in biodiversity offers the broadest array of options for sustainable economic development and a strong society.
- For many of us, our sense of place, wellbeing and cultural identity, relates to the particular biodiversity of our natural surroundings.

The state contains one of 34 global **biodiversity hotspots** and the only one in Australia. The South West Botanical Province has been recognised for the high number of endemic species it supports and the degree of threat to these species (Department of Conservation and Land Management 2004). While our knowledge of the Western Australian **biota** enables us to say that Western Australia has particular significance, there remains much that is unknown. In particular, our knowledge of genetic diversity is minimal (Government of Western Australia 1998a).

Given our State's significant biodiversity, the decline in the distribution and abundance of many species in Western Australia and the total loss of some species since European settlement are of grave concern. About 25 plant species are presumed extinct and 321 are threatened. Among the 149 known species of terrestrial mammals, 10 species are extinct and 31 are threatened

TERMS

Biological diversity or **biodiversity** — the variety of all life forms: the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part (Commonwealth of Australia 1996).

Natural area — a naturally vegetated area or non-vegetated area such as a water body (generally a river, lake or estuary), bare ground (generally sand or mud), rock outcrop.

Regionally significant natural area — a component of remnant **native vegetation**, rock outcrop or water body that collectively aims to form a comprehensive, adequate and representative system of **conservation areas**. In order to establish whether an area falls into this category it needs to be part of the existing or proposed conservation system or to meet (in part or whole) a range of agreed criteria (EPA 2003a).

Natural resources — land, water (fresh and marine), air and biodiversity resources.

Comprehensive, adequate and representative (CAR) reserve system — a reserve system characterised by the following (Department of Conservation and Land Management 2004):

Comprehensive: includes the full range of ecosystems recognised at an appropriate scale within and across each bioregion

Adequate: maintains the ecological viability and integrity of populations, species and communities

Representative: areas that are selected for inclusion in reserves reasonably reflect the biotic diversity of the ecosystems from which they derive.

(Government of Western Australia 1998a). In addition, 66 ecological communities have been identified as threatened and three are presumed extinct (Department of Conservation and Land Management 2004).

Although it was recognised in the 1996 national State of the Environment Report that 'the loss of biodiversity is perhaps our most serious environmental problem' (Department of the Environment, Sport and Territories 1996), the 2001 update found that 'many key threats to biodiversity identified in 1996 still persist' (Environment Australia 2001a). These include clearing of native vegetation, salinity and hydrological changes, sedimentation and nutrient loading, and invasive species (www.environment.gov.au/soe).

Protection of biodiversity is given the highest environmental priority rating in the Western Australian State of the Environment report (Government of Western Australia 1998a). The report found that while biodiversity protection is a widespread issue, the regions experiencing the greatest pressure on biodiversity are the Swan Coastal Plain, Wheatbelt, South Coast, Naturaliste, Pilbara and Great Sandy Desert.

One of the core objectives of the *National Strategy for Ecologically Sustainable Development* (Commonwealth of Australia 1992) is to protect biological diversity and to maintain essential ecological processes and life-support systems. The Government of Western Australia's *State Sustainability Strategy* specifically recognises that the conservation of biological diversity and ecological integrity are key principles for **sustainable development** (Government of Western Australia 2003a).

B1.1.1 BIODIVERSITY ISSUES

The national State of the Environment Report (Department of the Environment, Sport and Territories 1996) outlines over 50 major issues of concern for biodiversity. Some of the key findings/issues are:

- Climate change
- Human population — their lifestyles, technologies and demands on natural resources put the greatest pressures on biodiversity
- Habitat modification is a major cause of biodiversity loss, mainly via land clearance and degradation (for agriculture, urban and coastal development, and forestry)
- Introduced species (plants, animals and diseases) and the displacement of native species from their natural habitat or range are impacting on biodiversity
- Protecting biodiversity is handicapped without an integrated approach to land management based on a comprehensive system of bioregional planning including habitat corridors in agricultural lands
- An adequate system of conservation reserves is not yet in place.

B1.1.2 NATIONAL OBJECTIVES FOR BIODIVERSITY CONSERVATION

National objectives and targets for biodiversity conservation were published in 2001 (Environment Australia 2001a). The priority actions are to:

- protect and restore native vegetation and terrestrial ecosystems
- protect and restore freshwater ecosystems
- protect and restore marine and estuarine ecosystems
- control invasive species
- mitigate dryland salinity
- promote ecologically sustainable grazing
- minimise impacts of human-induced climate change on biodiversity
- maintain and record indigenous people's ethnobiological knowledge
- improve scientific knowledge and access to information
- introduce institutional reform.

The national target is to have clearing controls in place to prevent the removal of ecological communities with an extent below 30% of that present before 1750. A level of 30% of the pre-clearing extent of an ecological community is considered to be the threshold level below which

species loss appears to accelerate exponentially at the ecosystem level. To achieve the national target, the emphasis is on maintaining natural vegetation in-situ (within and outside conservation reserves) and on replacing losses by rehabilitating degraded areas with local native species.

B1.1.3 EPA'S BROAD PRINCIPLES FOR BIODIVERSITY CONSERVATION

EPA's objective

The EPA's objective for flora is to maintain the abundance, diversity, geographic distribution and productivity of flora at the species and ecosystem levels through the avoidance or management of adverse impacts and through improvement in knowledge (EPA 2004e).

The protection of Western Australia's biodiversity is one of the EPA's priority areas of concern. The EPA's broad principles for maintaining biodiversity are summarised below.

Maintain biodiversity at sustainable levels

All natural resources (land, water, air and biodiversity) must be managed with a view to maintaining native species and ecological communities at sustainable levels within regions.

The EPA considers it is important that ecological communities are maintained above the threshold level of 30% of the original pre-clearing extent of each community. This is a minimum level and should be higher for many ecological communities, for example, rare and geographically confined communities.

Ecological communities now at levels below 30% of their original extent in regions should be fully retained.

Threatened ecological communities and species should be fully protected and regenerated to sustainable levels.

Conserve biodiversity in situ

Biodiversity is best conserved in situ by:

- establishing a **comprehensive, adequate and representative** (CAR) system of conservation reserves
- retaining and rehabilitating land outside the main reserves system as habitat for indigenous plants and animals
- managing all land use and development within a region with a view to meeting overall biodiversity objectives and targets for the region.

The areas of high significance for the protection of biodiversity that should be fully protected are identified in B1.2.1 categories i) to vi) and x).

Avoid clearing

In regions that have been subject to considerable clearing and alteration of native vegetation, the EPA urges that any new development is located in previously cleared areas.

The EPA's view is that further clearing of native vegetation for agriculture in the south-western agricultural area, as defined in EPA Position Statement No. 2, is not acceptable (EPA 2000a).

Protect ecological linkages

Ecological linkages between key habitat areas should be protected and enhanced.

Anticipate threats to biodiversity

Processes and human activities that threaten biodiversity should be carefully anticipated, prevented and managed, including the spread of invasive species and diseases, salinity, pollution, altered surface water regimes and groundwater regimes, altered fire regimes, the escape of genetically modified organisms, soil degradation and the fragmentation of native habitat.

Make informed decisions

Decision-making at all levels should be made on an informed basis, and the precautionary principle applied where knowledge is lacking.

Apply the natural resource management framework

The EPA recommends that decision-making and management processes have regard for the framework for natural resource management set out in EPA Position Statement No. 8 (EPA 2005a).

Apply new understandings

The EPA urges on-going research, **monitoring** and evaluation. Systems need to be in place to ensure appropriate land management responses by government and the community to findings.

Mitigate adverse impacts

Projects that propose significant impacts on the environment should be required to demonstrate that the **mitigation** of impacts has been addressed through the application of considerations based on (in order of preference) avoidance, minimisation, rectification, reduction and **offsets** as set out in EPA Position Statement No. 9 *Environmental Offsets* (EPA 2006a).

Share responsibility

Every person has a role in protecting biodiversity – all levels of government, resource users, indigenous peoples and the community in general. The EPA urges that, wherever possible, approval systems, such as the planning system, conscientiously address the protection of biodiversity.

B1.1.4 EPA'S PUBLISHED POSITION

Key EPA publications that address the protection of biodiversity include:

- *Environmental Protection of Native Vegetation in Western Australia: Clearing of Native Vegetation with Particular Reference to the Agricultural Area Position Statement No 2* (EPA 2000a)
- *Environmental Protection and Ecological Sustainability of the Rangelands in Western Australia Position Statement No. 5* (EPA 2004c)
- *Principles of Environmental Protection Position Statement No. 7* (EPA 2004a)
- *Environmental Protection in Natural Resource Management Position Statement No. 8* (EPA 2005a).

B1.1.5 CONSIDERING BIODIVERSITY CONSERVATION DURING PLANNING

In view of the importance of maintaining biodiversity, the EPA urges that the issue is fully considered as far as possible during all land use planning processes.

The EPA sees particular value in linking planning decision-making in a locality to a regional strategy that deals comprehensively with the protection of biodiversity and the closely related issues of natural area and natural resource protection. This is especially so in areas which have been substantially cleared or where there is pressure for development. Without a regional strategy to assist the consideration of biodiversity it can be very difficult to address issues through day-to-day decision-making on development and subdivision applications. Advice on key natural areas to be protected is in B1.2.

It is recommended that structure plans, planning schemes and policies incorporate objectives to protect biodiversity, and include measures to protect high value natural areas and ensure appropriate management of natural resources outside conservation areas to meet environmental objectives. Decision-making on subdivisions, land uses and developments should reflect any comprehensive and accredited strategies that address biodiversity protection, avoid unacceptable adverse impacts on regional and local biodiversity, and consider the revegetation of cleared land.

More detailed advice on identifying, protecting and managing natural areas for their biodiversity and other **environmental values** at each level of planning is provided in the subsequent chapters of this Guidance Statement. In particular, the protection of ecological communities, native vegetation and flora is addressed in Chapter B2, and the protection of native fauna is addressed in Chapter B3.

B1.2 SIGNIFICANT NATURAL AREAS

This section identifies categories of natural areas that the EPA considers should be given a high level of protection. These are areas that are of regional, state or higher significance. Proposals and schemes that are likely to have a significant impact on these natural areas may trigger the formal environmental impact assessment process applied by the EPA under Part IV *Environmental Protection Act 1986* (EP Act).

Some natural areas need a high level of protection to ensure that the biodiversity representative of a region or sub-region is retained, important ecological processes continue, and special site **attributes** are conserved. Section B1.2.2 identifies a methodology for selecting significant natural areas for a regional conservation reserves system largely based on protecting representative areas of all ecological communities.

It is also essential that natural areas of local significance are identified and protected to meet the community's environmental objectives. Factors of most relevance to the selection process are indicated in Figure B1. Advice on identifying, protecting and managing locally significant natural areas in Perth local government areas is set out in *Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region* (Del Marco et al. 2004).

1.2.1 AREAS OF HIGH CONSERVATION SIGNIFICANCE

The EPA considers that the natural areas listed below are of high conservation significance and require a high level of protection in Western Australia. The list includes **critical environmental assets** and **high value environmental assets** (see A2.3). The EPA is unlikely to recommend the approval of projects that have significant adverse impacts on these natural areas.

Some of the categories below overlap, but are repeated to assist identification.

i) State and regional conservation areas

- Nature reserves, national parks, conservation parks, regional parks, marine parks, marine nature reserves and marine management areas in accordance with *Conservation and Land Management Act 1984* and *Land Administration Act 1997*
- Areas acquired and managed for any of the above purposes, pending formal reservation.
- Areas of the state recommended for protection in the EPA Systems **Red Books** (Department of Conservation and Environment 1976–1983), except where superseded by later conservation recommendations that are endorsed by government.
- Areas formally recommended by the Department of Environment and Conservation (DEC), for inclusion in the state's **conservation estate**.
- Areas with protection under planning schemes for their natural values, such as some parks and recreation reserves in the Perth Metropolitan Region, and regionally significant natural areas in Regional Open Space in the Greater Bunbury Region Scheme and the Peel Region Scheme.
- Areas recommended by any formally recognised process that designates land for conservation, such as Perth's Bush Forever (Government of Western Australia 2000b and updates) and some planning strategies.

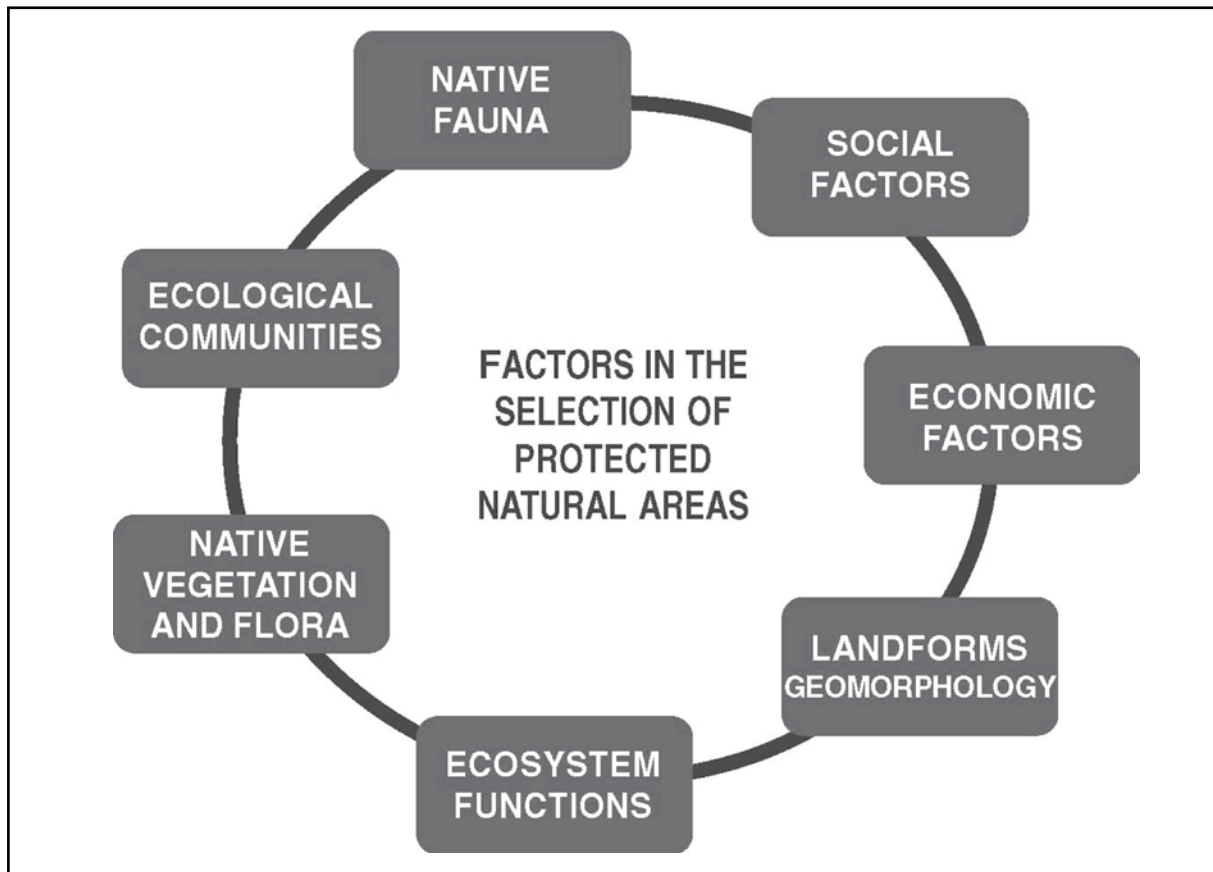


Figure B1. Factors in the selection of protected natural areas

ii) Areas where clearing would be at variance with the native vegetation clearing principles in Schedule 5 EP Act

Areas of native vegetation where clearing would be at serious variance with the principles listed in Schedule 5 EP Act. These state:

'Native vegetation should not be cleared if-

- a) it comprises a high level of biological diversity;
- b) it comprises the whole or part of, or is necessary for the maintenance of, a significant habitat for
- c) fauna indigenous to Western Australia;
- d) it includes, or is necessary for the continued existence of, rare flora;
- e) it comprises the whole or a part of, or is necessary for the maintenance of, a threatened ecological
- f) community;
- g) it is significant as a remnant of native vegetation in an area that has been extensively cleared;
- h) it is growing in, or in association with, an environment associated with a watercourse or wetland;
- i) the clearing of the vegetation is likely to cause appreciable land degradation;
- j) the clearing of the vegetation is likely to have an impact of the environmental values of any adjacent
- k) or nearby conservation area;
- l) the clearing of the vegetation is likely to cause deterioration in the quality of surface or underground water; or the clearing of the vegetation is likely to cause, or exacerbate, the incidence or intensity of flooding.'

iii) **Ecological communities**

- Areas that form part of a regional biodiversity protection framework that aims to retain ecological communities above their threshold level in a bioregion (usually this is at least 30% of the pre-clearing extent of the community).
- Where a comprehensive regional biodiversity protection framework has not been developed, areas that meet the criteria for regionally significant natural areas (see B1.2.2), as accepted by the EPA.
- In **constrained areas** as recognised by the EPA (for example, the Perth Metropolitan Region and the Bunbury Region), areas with ecological communities that are at 10% or less representation of the pre-clearing extent of that community in the constrained area (see Government of Western Australia 2000b, EPA 2003a, EPA 2003b).
- Areas with threatened ecological communities as listed by DEC or the Australian government (see Attachment B2-1).
- Areas with other significant vegetation or ecological communities, as accepted by the EPA.

iv) **Significant flora and fauna**

- Areas containing Declared Rare Flora under the *Wildlife Conservation Act 1950*, areas important for Priority Flora species as listed by DEC (see Attachment B2-1), or areas with other significant flora as accepted by the EPA.
- Habitat on which Specially Protected Fauna or Priority Fauna depend, or habitat on which other fauna species of special interest depend (for example, habitat specialists with limited distribution in the region, wide-ranging species with declining populations in the region).
- Habitat important for birds that are the subject of the JAMBA and CAMBA migratory bird agreements (see Attachment B3-3).

v) **Wetlands and buffers**

- Ramsar wetlands and their buffers.
- Wetlands listed in *A Directory of Important Wetlands in Australia* (latest edition of Environment Australia 2001b) and buffers.
- Environmental protection policy (EPP) wetlands and their buffers.
- Conservation category wetlands and buffers, as accepted by the EPA.

vi) **Rivers and foreshores**

- Wild and scenic rivers as identified by the Australian Heritage Council and the Department of Environment and Conservation, and their foreshores.

vii) **Landscape and landforms**

- Important landscapes, landforms, features or environmental icons, as accepted by the EPA.
- Landforms or natural landscapes that are rare, poorly retained or of significant scientific or other interest, as accepted by the EPA.

viii) **Natural areas of heritage significance**

- Natural areas of world, national or state heritage significance, for example, world heritage property, places on the national heritage list, biosphere reserves under the UNESCO Man and Biosphere program, places on the Heritage Council of Western Australia's lists.
- Natural areas of indigenous heritage importance, in accordance with the *Aboriginal Heritage Act 1972* and as accepted by the EPA.

ix) **Other**

- Quality ecological linkages between areas of conservation significance.
- Other natural areas with important environmental values as accepted by the EPA.
- Sites required to be provided as 'replacement' or 'offset' sites by conditions of approval on projects that disturb regionally or nationally significant vegetation.

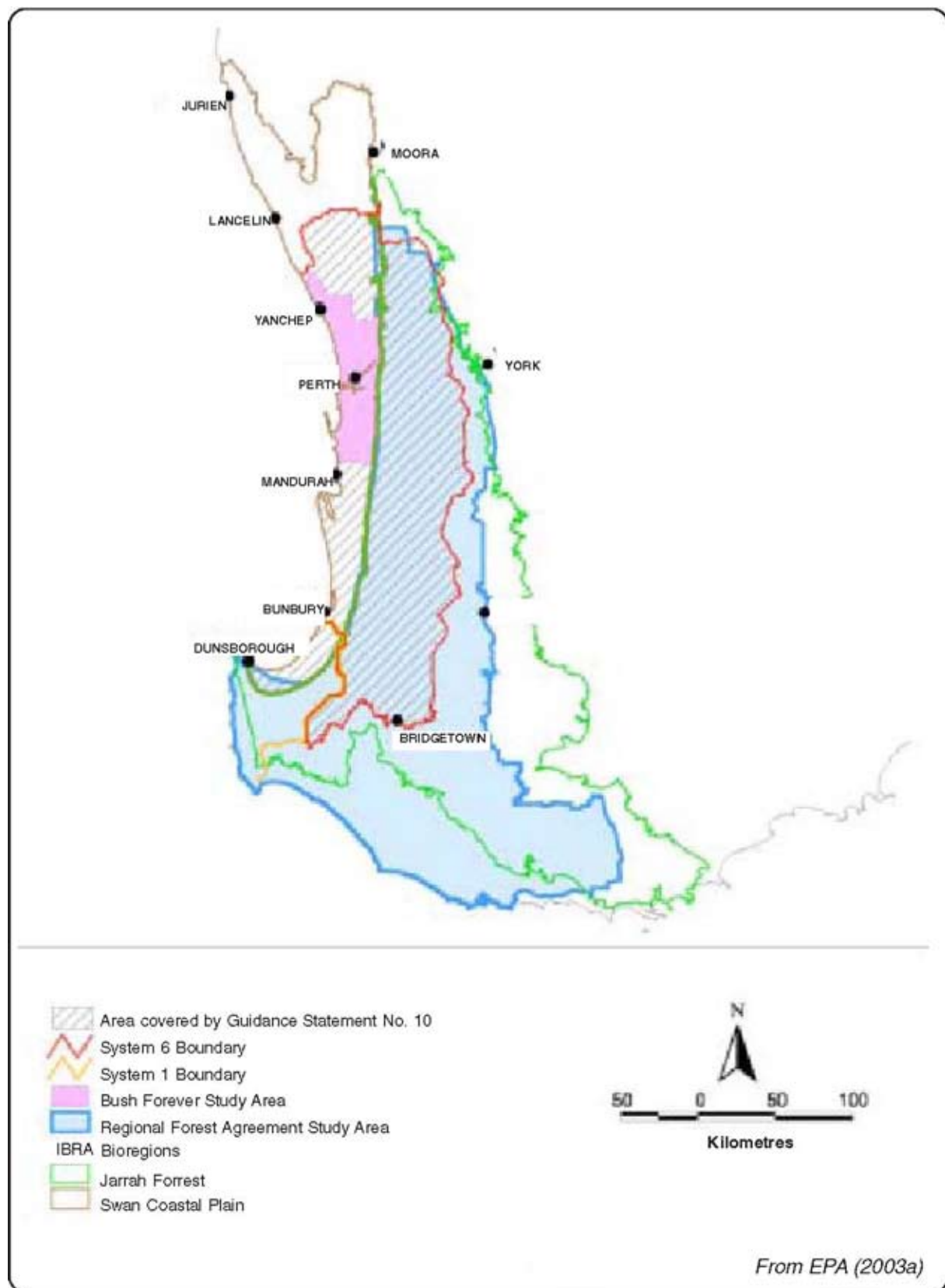


Figure B2. Area covered by Guidance Statement No. 10

B1.2.2 METHODOLOGY FOR IDENTIFYING NATURAL AREAS FOR A REGIONAL SYSTEM OF CONSERVATION AREAS

This section outlines a methodology that has been developed by government agencies and accepted by the EPA for the identification of regionally significant natural areas for a comprehensive, adequate and representative (CAR) system of conservation areas in portions of the south west of the State. The methodology was developed for Perth's Bush Forever (Government of Western Australia 2000b) and has been subsequently modified.

The methodology and criteria that have been developed for the System 6 Region and part of System 1 Region (see Figure B2) are described in EPA Guidance Statement No. 10 (EPA 2006b) and the EPA's report on the Greater Bunbury Region Scheme (EPA 2003a Appendix 3). The reader is referred to these documents for full details.

In brief, the methodology adopts the following main environmental criteria:

Representation of ecological communities

Areas selected to represent the range of ecological communities and the places in which these communities merge.

Diversity

Areas with a high diversity of landforms, flora and/or fauna species or communities in close association.

Rarity

Areas containing rare or threatened communities or species, or species of restricted distribution.

Maintaining ecological processes or natural systems

Areas that are important for the maintenance of ecological processes or natural systems at a regional or national scale, including substantive wildlife corridors connecting **bushland** areas.

Scientific or evolutionary importance

Areas containing evidence of evolutionary processes either as fossilised material or as relict species and areas containing unusual or important geomorphological or geological sites; areas of recognised scientific and educational interest as reference sites or as examples of the important environmental processes at work.

Protection of wetland, streamline and estuarine fringing vegetation and coastal vegetation

Conservation category wetland areas including fringing vegetation and associated upland vegetation; coastal vegetation within the accepted coastal management zone.

It is expected that similar criteria would apply to other regions of the state, subject to confirmation by the relevant agencies.

Chapter B2

Native terrestrial vegetation

B2.1 SIGNIFICANCE OF NATIVE TERRESTRIAL VEGETATION AND FLORA

The vegetation and flora of Western Australia provides a rich source of biodiversity by world standards. Native vegetation has a critical role in maintaining the ecological processes that support the right conditions for life, and preventing land and water degradation.

However, Western Australia in common with other Australian states has experienced a long-term decline in the extent and quality of native vegetation. Of Western Australia's 819 vegetation associations, a total of 119 have been reduced below 30% of their pre-European extent, and of these 48 are reduced to 10% or less, and two are presumed extinct (Shepherd et al. 2002). The Swan Coastal Plain, Wheatbelt, South Coast, Naturaliste, Pilbara and Great Sandy Desert are all under significant stress.

Human activities have had a major impact on native vegetation, particularly agriculture and urbanisation.

The important issues associated with the clearing of native vegetation include:

- loss of biodiversity in terms of
- individual species, species assemblages and genetic variability
- land **salinisation**, and the salinisation of inland waters
- waterlogging
- sedimentation and increased turbidity in waterways and wetlands
- erosion and loss of soil fertility
- deterioration in soil processes that break down and absorb pollutants
- an increase in peak river flows
- reduction in the extent, the
- connectivity and the quality of
- habitat for native fauna, and subsequent decline in the numbers and species of fauna
- accelerated release of carbon
- compounds to the atmosphere
- following clearing, and the reduction of the amount of carbon removed from the atmosphere, contributing to the human-induced greenhouse gas problem

TERMS

Vegetation – the combinations of plant species within a given area, and the nature and extent of each combination.

Vegetation unit – a general purpose term applied to vegetation categories regardless of the scale. Examples of vegetation unit terms used in Western Australia are **vegetation complex** (Hedde et al. 1980), **vegetation association** and **vegetation type** (Beard 1974–1981, Beard 1990, Shepherd et al. 2002).

Flora – the plant species, subspecies and varieties in a given area.

Significant vegetation – includes but is not limited to native vegetation with any of the following characteristics:

- a **threatened ecological community** (see Attachment B2-1)
- below a **threshold** level (see B2.2)
- scarcity
- unusual species
- novel combination of species
- key habitat for **threatened species** or large populations
- representative of the range of a vegetation unit including the extremes of the range, or a good example in prime habitat
- a restricted distribution.

Significant flora – includes but is not limited to flora with any of the following characteristics:

- **Declared Rare Flora or Priority Flora** (see Attachment B2-1)
- key role in a habitat for threatened species or large populations
- relic status
- anomalous features that indicate a potential new discovery
- representative of the range of a species including the extremes of the range
- a restricted subspecies, variety or naturally occurring hybrid
- local endemism or a restricted distribution.

(Note: significance may apply at any level, for example, local, regional, national and international.)

Ecological community – naturally occurring biological **assemblage** in a particular type of **habitat** (English & Blyth 1999). The scale at which ecological communities are defined will depend on the level of detail in the information source. For practical reasons, ecological communities are often represented by vegetation **units**.

(Definitions from EPA 2004a.)

- spread of some weeds, pests and diseases, and consequent deterioration of ecological communities and **ecosystem functions**
- reduction in some of the raw materials that support economic development, occupations and other human activities, and may adversely affect a range of tourism and recreation opportunities
- impacts on lifestyle opportunities, which in turn affects people's well-being
- loss of community and personal wellbeing – native vegetation contributes substantially to the 'sense of place' of a locality and has special significance for many people for cultural, spiritual and aesthetic reasons, and as a source of scientific information
- fewer natural resources and opportunities and less natural diversity available, and more environmental problems, for future generations
- substantial public and private funds, and community and government effort have to be spent on environmental repair projects following the excessive removal of native vegetation.

The initial impacts of clearing or disturbance are compounded by the creation of non-contiguous bushland remnants and the deterioration in quality of remaining native vegetation through **edge effects** (see Attachment B2-2).

Many problems caused by clearing have proven to be intractable. Some species can only be propagated or re-introduced at great expense and with prolonged effort. Once soils, water regimes and microclimates are disturbed, it is virtually impossible to reproduce natural ecological communities and the **ecosystem services** provided by native vegetation and flora, within the means of most management systems.

B2.2 EPA'S BROAD PRINCIPLES FOR THE PROTECTION OF NATIVE TERRESTRIAL VEGETATION AND FLORA

EPA's objective

The EPA's objective for flora is to maintain the abundance, diversity, geographic distribution and productivity of flora at the species and ecosystem levels through the avoidance or management of adverse impacts and through improvement in knowledge (EPA2004e).

The EPA has established the following broad principles for the protection of native terrestrial vegetation and flora.

Avoid clearing

The EPA considers that all further clearing warrants a precautionary approach, in view of the substantial levels of clearing that have occurred, the problems that have arisen as a result of the clearing of native vegetation, and the immense community and government effort that is involved in countering these problems. In some areas, such as the Wheatbelt, the EPA considers that any further reduction in native vegetation through clearing cannot be supported from an environmental perspective (EPA 2000a).

Under new laws passed, clearing native vegetation will require a permit unless the clearing is for an exempt purpose. Clearing should not occur unless consistent with the principles for clearing native vegetation set out in Schedule 5 *Environmental Protection Act 1986 (EP Act)* (see B1.2.1). Further information on clearing permits can be found on the DEC website (www.dec.wa.gov.au).

Maintain biodiversity at sustainable levels

To protect biodiversity, representative areas of all ecological communities need to be maintained and managed above the threshold level at which species loss appears to accelerate exponentially. This generally means retaining each ecological community at an overall level of at least 30% of the original extent of the ecological community in each region.

Where less than 30% of an ecological community persists in a region, the EPA expects that every effort will be made to protect all the remaining community (EPA 2000a).

Retaining more than 30% of some ecological communities is necessary in some areas to protect rare and geographically restricted communities, or to ensure important ecosystem services are maintained.

Prepare and implement regional strategies for native vegetation and biodiversity protection

The EPA supports the development and implementation of regional strategies for native vegetation and biodiversity protection or comprehensive natural resource management strategies that identify objectives and measures to protect native vegetation and flora. Regional strategies are especially important where extensive clearing has occurred or where development pressures exist. EPA Preliminary Position Statement No. 8 *Environmental Protection in Natural Resource Management* (EPA 2005a) contains a useful broad framework for the management of all natural resources.

The quality of native vegetation, as well as its extent, requires protection. The potential impacts of land uses and development on significant native vegetation and flora need to be identified (direct, indirect and cumulative impacts) and managed with a view to meeting the overarching environmental objectives for the region.

Conserve biodiversity in situ

- Native vegetation and flora should be protected by:
- retaining representative areas of all ecological communities
- retaining significant vegetation and significant flora
- establishing a comprehensive adequate and representative system of conservation reserves
- maintaining and rehabilitating areas of native vegetation outside the reserves system
- retaining or creating ecological linkages between the above areas
- managing all land use and development within a region to avoid adverse impacts (direct, indirect and cumulative) on vegetation identified for protection
- locating development on cleared land in preference to areas of native vegetation.

Large project and development areas should include a comprehensive and adequate network of conservation areas and linking corridors. Within some urban areas where the retention of each ecological community may be lower than 30%, the EPA nonetheless expects that the 30% target will be achieved in the larger region.

Areas of high conservation significance that should be conserved in Western Australia are identified in Chapter B1. To meet the community's environmental objectives, additional areas should also be protected and rehabilitated.

Reintroduce native vegetation

Initiatives to reintroduce and recover native vegetation using local provenance are strongly encouraged, especially in regions where native vegetation is poorly retained or species or communities are threatened.

Prevent loss of biodiversity

No known species of indigenous plant or animal, or community of indigenous plants or animals should be placed in long-term jeopardy or cease to exist as a result of any project. An ecological community that is at 10% or less of the original extent in a region is considered to be **critically endangered**.

Make informed decisions

For proposed development sites that contain native vegetation, adequate survey work and assessment addressing vegetation and flora characteristics, values, issues, threats, functions, significance, overarching environmental objectives and appropriate management are central to developing sustainable outcomes.

Apply new understanding

The EPA urges on-going research and monitoring of native vegetation and flora. Systems need to be in place to ensure appropriate land management responses by government and the community to findings.

Mitigate adverse impacts

In exceptional circumstances, where disturbance of significant vegetation or flora is determined to be acceptable, the EPA's position is that measures that mitigate for adverse impacts should be implemented with the objective of achieving a net environmental benefit. Mitigation measures in order of preference are: avoidance of adverse environmental impacts, minimisation of impacts, rectification, reduction and offsets. The EPA's position on the use of **mitigation** measures and environmental **offsets** is in Position Statement No. 9 *Environmental Offsets* (EPA 2006a).

B2.2.1 EPA'S PUBLISHED POSITION

The following documents set out the EPA's published position on aspects of native vegetation and flora protection.

Position statements

- *Environmental Protection of Cape Range Province* Position Statement No. 1 (EPA 1999)
- *Environmental Protection of Native Vegetation in Western Australia: Clearing of Native Vegetation, with Particular Reference to the Agricultural Area* Position Statement No. 2 (EPA 2000a)
- *Terrestrial Biological Surveys as an Element of Biodiversity Protection* Position Statement No. 3 (EPA 2002a)
- *Environmental Protection and Ecological Sustainability of the Rangelands in Western Australia* Position Statement No. 5 (EPA 2004e).

Guidance statements

- *Guidance Statement for the Protection of Tropical Arid Zone Mangroves along the Pilbara Coastline* Final Guidance Statement No. 1 (EPA 2001a)
- *Guidance Statement For Rehabilitation of Terrestrial Ecosystems* Final Guidance Statement No. 6 (EPA 2006c)
- *Level of Assessment for Proposals Affecting Natural Areas within the System 6 Region and Swan Coastal Plain Portion of the System 1 Region* Final Guidance Statement No. 10 (EPA 2006b)
- *Guidance Statement for Assessment of Development Proposals in Shark Bay World Heritage Property* Final Guidance Statement No. 49 (EPA 2000b)
- *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* Final Guidance Statement No. 51 (EPA 2004d).
- *Guidance Statement for Environmental Offsets* Draft Guidance Statement No. 19 (EPA 2007c)

Reports

- *Conservation Reserves for Western Australia as Recommended by the Environmental Protection Authority* (Department of Conservation and Environment 1976–1983). Note that some recommendations are now superseded.
- *Greater Bunbury Region Scheme: Western Australian Planning Commission: Report and recommendations of the EPA* (EPA 2003a)
- *Advice on Aspects of Bush Forever* (EPA 2001b).

B2.2.2 AREAS OF HIGH CONSERVATION SIGNIFICANCE IN WESTERN AUSTRALIA

The EPA considers that the native vegetation and flora in the areas listed in B1.2.1 are of high conservation significance and should be fully protected in Western Australia. The EPA is unlikely to recommend the approval of projects that have significant adverse impacts on these areas, except in special circumstances.

Advice on the EPA's approach to the environmental assessment of projects involving impacts on natural areas in the south west of the state within the System 6 area and the southern Swan Coastal Plain region is in Guidance Statement No. 10 (EPA 2006b). Figure B2 shows the area to which Guidance Statement No. 10 applies. For clarity, areas considered by the EPA to be of high conservation significance in Perth's Bush Forever study area are listed in Attachment B2-3.

B2.3 CONSIDERING NATIVE VEGETATION AND FLORA DURING PLANNING

B2.3.1 BROAD SCALE PLANNING

A generic checklist of steps to help ensure each environmental factor is adequately considered during broad scale planning is set out A1.4.1. The steps urge consideration of native vegetation and flora issues early in strategic planning for a region or locality, and integration between planning processes and other decision-making and strategic processes that address biodiversity protection and natural resource management.

Unless adequate procedures are put in place during the early stages of the development of a region to guide the protection of areas of native vegetation, the region may later face the complex and expensive exercise of implementing a regional reserves system like Bush Forever, to meet the community's conservation goals. Furthermore, repairing and restoring natural systems and implementing engineering solutions in place of natural ecosystem processes performed by native vegetation can be very costly and problematic. These remediation measures cannot replicate natural values and functions entirely.

It is important that broad scale planning is based on adequate information. It may be necessary to commission studies to address the characteristics and significance of the native vegetation and flora, especially if the existing information base is poor, if there is a demand for new development areas, or if the planning exercise must provide a high level of certainty. Advice on the level of survey work for different parts of the state in relation to particular types of impacts on biodiversity is provided in EPA Guidance Statement No. 51 (EPA 2004d).

The level of information on which broad scale planning is based, as well as the scale and nature of the potential impacts on native vegetation and the sensitivity of the receiving environment, will influence the subsequent studies and surveys that may need to be carried out to support development and subdivision.

A detailed methodology for identifying, protecting and managing natural areas in local government areas of the Perth metropolitan region is described in *Local Government Biodiversity Planning Guidelines for the Perth Metropolitan Region* (Del Marco et al. 2004).

Where urban or other development is required to fulfil regional planning objectives, it is expected that an adequate network of natural areas will be identified and protected on reserves and private property to protect biodiversity, to maintain ecological processes and to meet human needs and demands (see checklist below).

Maintaining ecological linkages between natural areas is important. Key linkages include river corridors, connected sequences of ecological communities, and linkages between regionally significant natural areas. Where substantial clearing has taken place, 'stepping stone' linkages and revegetated corridors will have value for some species.

When considering land uses near areas of high conservation value, it is important to consider all the potential implications for the conservation areas. For instance, sometimes large bushfire hazard separation zones are necessary between bushland and residences to reduce risk to life and property. Hazard separation zones involve either the removal of, or modification to, native vegetation. Where these actions are not consistent with environmental objectives, alternative locations for development should be considered. Another example concerns disease-vector and nuisance insects. Control of mosquitoes and midges in conservation category wetlands or waterways near residential areas may conflict with the management objectives for the conservation areas. Where protection of natural values is paramount, large buffers to residential areas may need to be considered.

CHECKLIST FOR SITE PLANING TO PROTECT KEY NATIVE VEGETATION AND FLORA

- ☐ Avoid the disturbance of native vegetation.
- ☐ Retain areas identified in accredited regional and local strategic and structure plans, natural resource management plans and site-specific assessments for the protection of native vegetation and for revegetation.
- ☐ Retain representative areas of all ecological communities and landforms in large project areas.
- ☐ Retain connected sequences of ecological communities and establish bushland corridors to link the main conservation areas (or consider creating these in cleared areas).
- ☐ Retain natural areas which regionally and locally support a high diversity of native flora, fauna and/or range of ecological communities.
- ☐ Retain regionally and locally scarce ecological communities, flora and fauna habitats.
- ☐ Retain natural areas that regionally and locally have the best quality native vegetation.
- ☐ Protect wetland, streamline and estuarine fringing vegetation and coastal vegetation.
- ☐ Retain areas of scientific, evolutionary or cultural importance.
- ☐ Around significant natural areas, locate and manage land uses and development so as to avoid adverse impacts on conservation values. Typically, maintain buffers around significant flora and vegetation to assist in the management of edge effects.
- ☐ Locate a road between urban development and bushland to improve surveillance and deter vandalism.
- ☐ Retain native vegetation in areas prone to land degradation, for example, erosion.
- ☐ Retain vegetation where clearing is likely to cause the deterioration of the quality of surface or underground water, for example, where possible retain sufficient vegetation in the upper parts of catchments prone to salinity.
- ☐ Retain vegetation where clearing could lead to erosion or sedimentation and increased turbidity in wetlands and waterways.
- ☐ Retain natural areas for their contribution to the community's 'sense of place' and experience of well-being.
- ☐ In cleared regions, include areas to be revegetated with species of local provenance to assist biodiversity protection and to maintain ecological services such as stormwater infiltration.
- ☐ Preferably retain large, compact areas of native vegetation.
- ☐ Preferably retain a number of large replicates of an ecological community.

B2.3.2 LOCAL AREA PLANNING

The general considerations listed above also apply to detailed plans, rezonings, subdivisions and development projects. Preferably, incremental development should be consistent with a regional strategy that takes into account regional and local biodiversity and natural area protection and the maintenance of the key ecosystem processes that support life.

This section should be read in conjunction with the generic advice on local area planning in A1.4.2.

For all rezoning and development projects that may impact on native vegetation, the EPA urges authorities and applicants to obtain adequate information on the values and characteristics of the native vegetation, and to consider its role in maintaining healthy catchments and biodiversity. It is generally best to carry out adequate surveys and evaluation at the initial stages of project formulation (see B2.3.3).

The EPA encourages initiatives to achieve the maximum retention of native vegetation, restoration of the quality of bushland, and the rehabilitation of land (using local provenance) in association with rezonings, subdivision and development. The native vegetation clearing provisions of the EP

Act are not expected to replace the need for planning to consider native vegetation, especially as a number of clearing permit exemptions apply to planning processes (*Clearing Exemptions – How They Work* Department of Environment 2004a).

Measures that can protect native vegetation include reserves, covenants on titles, scheme provisions, conditions on planning applications, and the designation of areas to be protected or rehabilitated on approved plans.

Local planning policies can provide useful guidance on aspects of native vegetation protection and revegetation, for example, on-site biodiversity management, rehabilitation and landscaping using indigenous species, and measures to minimise the impacts of development in the vicinity of significant natural areas.

A checklist of areas to protect is in B2.3.1. These areas should preferably be shown as protected areas on approved plans. A checklist of management actions that can be made enforceable through scheme provisions, approved plans and planning application approval conditions is listed below.

CHECKLIST OF MANAGEMENT ACTIONS TO PROTECT NATIVE VEGETATION AND FLORA

☐ **Management actions for each stage of development**

Consider actions to apply to:

- pre-construction phase (for example, prepare management plans, carry out surveys to record conditions in conservation areas to provide a baseline for ongoing monitoring and management purposes)
- construction activities (for example, limit disturbance to defined areas, define construction access routes, manage works to prevent erosion and sedimentation in receiving waters, dieback and weed management, appropriate disposal of surplus soil and rubbish, introduction of disease-free fill)
- the ongoing maintenance and development (for example, management of nutrients, air pollutants, contaminants and wastes that may affect conservation areas)
- decommissioning (for example, rehabilitation)
- stormwater, waste water and irrigation management.

☐ **Management of designated natural areas and rehabilitation areas**

Protect, repair and/or revegetate designated areas of native vegetation using local species and clearly define these areas on a map. Consider:

- repair for portions of the land degraded due to erosion or other problems
- the stabilising and revegetation of land prone to degradation
- repair or protection of areas recommended in catchment or other strategic plans
- provision of fauna habitat
- plantings around wetlands and drainage lines
- buffer areas around natural areas with high environmental values
- plantings to connect and complement areas of native vegetation on and adjoining the site
- criteria for revegetation to address the use of species of local provenance, plant density and the replacement of losses
- fencing
- fire management and access control
- predator and weed control
- control of rubbish and soil dumping.

continued...

CHECKLIST OF MANAGEMENT ACTIONS TO PROTECT NATIVE VEGETATION AND FLORA

☐ **Mitigation**

Where some clearing of native vegetation is allowed, consideration should be given to mitigation measures that help manage environmental losses. The EPA's advice on mitigation and environmental offsets in the case of significant adverse environmental impacts is in Preliminary Position Statement No. 9 *Environmental Offsets* (EPA 2004c).

Where minor environmental impacts on native vegetation are involved, conditions on projects may include:

- ☐ land repair and revegetation
- ☐ collection of seed and plants that can be translocated
- ☐ stockpiling of topsoil for use in regeneration areas (subject to disease and weed considerations).

☐ **Development near bushland**

Where development is to proceed near significant bushland, prevent undue disturbance of the bushland during and after construction. Conditions on development may include:

- ☐ maintaining vegetated buffers
- ☐ stormwater management to maintain the pre-development water regime in conservation areas
- ☐ fencing (during and after construction)
- ☐ weed and predator control
- ☐ erecting clear signage
- ☐ providing information to contractors
- ☐ dieback and disease prevention measures
- ☐ prohibiting disposal of earth or any other debris in the bushland
- ☐ requiring only clean weed-free fill to be used adjacent to bushland
- ☐ installing a physical barrier to control grass invasion
- ☐ positioning water reticulation systems away from bushland
- ☐ rehabilitating bushland in the event that it is disturbed during construction.
- ☐ where there is a risk from pathogens, such as dieback, implement dieback prevention measures in accordance with Department of Environment and Conservation (DEC) protocols.

☐ **Environmental management plans**

Carry out management of native vegetation and adjoining development in accordance with an approved **environmental management** plan. A checklist of items to consider for inclusion in an environmental management plan for a local bushland area is set out in Attachment B2-4.

B2.3.3 SURVEY AND ANALYSIS OF NATIVE VEGETATION AND FLORA FOR DEVELOPMENT PROJECTS

Any development project that may disturb native vegetation should be accompanied by the timely provision of adequate information on the native vegetation and flora that may directly or indirectly be impacted, to assist the relevant decision-making authorities to consider the protection of key vegetation and flora values.

The EPA has been concerned that, at times, insufficient attention is given to the appropriate amount, timing, detail and quality of botanical information accompanying development proposals for projects that may impact on native vegetation.

The level of analysis and survey of native vegetation and flora to assist decision-making on planning and development projects will depend on such factors as the stage of the planning process, the level of existing information, the extent and nature of environmental strategies for the region,

the level of retention of native vegetation in the region, the functions of the vegetation, the likelihood of significant flora and vegetation, and the potential severity of impacts.

For minor impacts (see Appendices 2 and 3 of Guidance Statement No. 51), as a starting point, a desktop review and site visit should first be undertaken. For some locations, Department of Environment and Conservation (DEC) regional offices may be able to provide preliminary advice and make recommendations on studies.

For the purposes of the environmental impact assessment process in Western Australia, the EPA has provided guidance on surveys in Position Statement No. 3 *Terrestrial Biological Surveys as an Element of Biodiversity Protection* (EPA 2002a) and, in more detail, in EPA Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environment Impact Assessment in Western Australia* (EPA 2004d). The reader should refer to Guidance Statement No. 51 if a proposal or scheme requires referral to the EPA.

The potential for the vegetation and flora of a site to have significance for fauna or the maintenance of ecological processes (for example, maintenance of water quality, prevention of salinity) should also be considered.

CHECKLIST FOR COMPREHENSIVE REPORTING ON NATIVE VEGETATION AND FLORA ISSUES TO ACCOMPANY DEVELOPMENT PROJECTS

It is recommended that applicants and decision-makers consider this checklist when significant impacts on native vegetation and flora are likely and full evaluation of the issues is appropriate. Applicants should clarify with the relevant authorities the information they need to provide with applications, as some authorities already hold some information or have natural area protection strategies in place. If a scheme or proposal is assessed by the EPA, the EPA may require work that differs from this generic checklist.

- ☐ Research existing information relevant to the native vegetation and flora of the locality and region to identify relevant values, issues, significance, objectives, priorities and threats. Consider **stakeholder** consultation, government databases, reports, publications, policies and strategies applying to native vegetation, flora and biodiversity.
- ☐ Identify the extent of potential direct, indirect and cumulative environmental impacts from implementation of the proposed planning project on the values and functions associated with native vegetation and flora, both on and off the study area.
- ☐ Carry out flora and vegetation survey/s of the site and adjoining land to provide information to help determine the significance of the flora and vegetation of the site. It is recommended that survey work and the area surveyed are consistent with the advice in EPA Guidance Statement No. 51 (EPA 2004d). The survey methodology and all limitations to survey work should be noted. The vegetation and flora survey report should describe:
 - ☐ the flora in terms of a comprehensive listing of species collected, and proportion of total on-site species likely to have been collected
 - ☐ significant flora both collected and potentially present
 - ☐ the vegetation units on the site and on adjoining land (a map is an essential part of the description) and their key component species
 - ☐ significant vegetation both identified on the site and potentially present
 - ☐ proximity to and connectivity with other vegetation (include mapping), and a discussion of linkage values in the local and regional context
 - ☐ vegetation structure described in a standardised format
 - ☐ vegetation **condition** described in a standardised format, for example, in the Perth region, the format outlined in Government of Western Australia (2000d). The condition survey should include evidence of, and susceptibility to, disease and introduced species

continued...

CHECKLIST FOR COMPREHENSIVE REPORTING ON NATIVE VEGETATION AND FLORA ISSUES TO ACCOMPANY DEVELOPMENT PROJECTS

- contextual information, for example, level of existing biological information, pattern of clearing in the region, geomorphological setting, indigenous and non-indigenous heritage values, current human use, infrastructure on the site, adjoining land uses, fire history.
- ❑ Carry out other biological and natural area surveys as relevant to establish other roles of the vegetation and flora, for example:
 - the role of the vegetation in maintaining fauna, including Specially Protected and Priority Fauna, and fauna that is otherwise significant (see Chapter B3).
 - the roles provided by the vegetation on the site in maintaining natural processes (for example, ground and surface water quality and quantity, soil stability).
- ❑ Examine the level of retention of each of the ecological communities potentially affected compared with the original extent of the community in the region. Comparisons should be made at the level of the most detailed regional work available, for example, vegetation complex or vegetation association (sources of mapping or data include Heddl et al. 1980, Mattiske & Havel 1998, Shepherd et al. 2002, Connell et al. 2001, Government of Western Australia 2000b, www.walis.wa.gov.au and DEC).
- ❑ Ascertain the significance of the native vegetation and flora at the international, national, regional and local levels.
- ❑ Consider whether there are wider social and economic considerations relevant to the area of vegetation, for example, zoning and existing approvals, landscape, aesthetic, heritage and recreational values
- ❑ Report on:
 - key native vegetation and flora attributes
 - environmental values, functions, issues and significance (regional and local) associated with the native vegetation and flora
 - relevant environmental objectives and priorities for native vegetation and flora for the locality and region
 - likely impacts on native vegetation and flora (direct, indirect and cumulative) and their significance
 - management measures and follow-up actions that will ensure objectives will be met.

B2.4 REFERRAL TO THE EPA

The information in this section should be read in conjunction with the generic advice for the referral of schemes and proposals to the EPA in A3.2.1 and A4.2.1.

With respect to the environmental factor 'native vegetation', the EPA expects, in the first instance prior to considering referral to the EPA, that applicants and decision-making authorities will use their best endeavours to achieve a satisfactory environmental outcome, based on:

- consideration of adequate information on the native vegetation and flora
- the application of biodiversity and native vegetation protection policies, guidelines and strategies issued by the government, government agencies and other accredited sources
- consultation with agencies with relevant expertise and decision-making responsibilities – these may include DEC and the Department for Planning and Infrastructure (DPI) in the case of schemes and proposals that are likely to impact on Bush Forever sites.
- consultation with other stakeholders and the public as appropriate
- consideration of appropriate location and design, and the application of conditions through relevant approval processes.

If the above approach is followed, the number of proposals that may need to be referred to the EPA, and the number of schemes and proposals that require assessment, is likely to be minimised.

B2.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

In the case of a proposal that may impact on native vegetation and flora, referral to the EPA pursuant to s38 EP Act should be considered if the proposal is likely to adversely impact on native vegetation and flora in an area of high conservation significance as listed in Chapter B1.

Recommended pre-referral steps, and indicators for the referral of a subdivision or development proposal to the EPA by a **decision-making authority** are in Figure A4 and Attachment A4-1.

It is noted that the protection of Specially Protected Fauna and Rare Flora is largely managed by DEC under the *Wildlife Conservation Act 1950*. DEC may refer a proposal to the EPA.

Referral is generally not expected if a proposal complies with an accredited management plan for a conservation area.

For proposals in the System 6 region and Swan Coastal Plain portion of the System 1 region, EPA Guidance Statement No. 10 (EPA 2006b) indicates the level of assessment that is likely to be set by the EPA. The EPA applies the same criteria to schemes.

B2.4.2 INFORMATION TO ACCOMPANY A REFERRAL

Information on native vegetation that is sufficient for the EPA to set the level of assessment following the referral of a scheme or proposal will vary, depending on the location and nature of the scheme or proposal.

Basic helpful information on native vegetation and flora includes:

- an aerial photo on which the proposal or scheme area and key components of development and land use have been precisely superimposed
- details of the potential impacts on native vegetation on site and any potential impacts on adjacent land with conservation values
- a description of the environmental attributes and values of the site's natural areas. Identify any site-specific investigations or relevant regional studies that have been carried out or are proposed. Any survey work carried out should comply with the advice in EPA Guidance Statement No. 51 (EPA 2004d)
- a review of site selection options and project design elements
- a description of why the development needs to impact on important environmental assets, for example, on a regionally significant natural area, a threatened community or species
- management measures proposed to mitigate the potential impacts on native vegetation
- other approvals that may be required, for example, approval under the *Wildlife Conservation Act 1950* or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*
- comments of key agencies, for example, DEC. In the case of a scheme or proposal in the Bush Forever study area that adjoins or directly impacts on a Bush Forever site, the comments of the DPI (Bush Forever Office) should be obtained.

If necessary, the EPA can request further information to enable the level of assessment to be set. Where further information is required and where possible, please provide all relevant data in digital and GIS format.

Attachment B2-1

Declared Rare Flora, Priority Flora and Threatened Ecological Communities

WHAT ARE DECLARED RARE FLORA AND PRIORITY FLORA?

In Western Australia, under the *Wildlife Conservation Act 1950*, Rare Flora are specified species that:

- are likely to become extinct or are rare, or otherwise in need of special protection; or
- are presumed to be extinct in the wild and therefore in need of special protection should they be rediscovered.

It is an offence to take Rare Flora for any purpose and on any lands without the written consent of the responsible minister.

Priority Flora species in Western Australia are species under consideration by the DEC for declaration as Rare Flora, or are rare though not currently threatened. Unlike the Rare Flora list, the Priority Flora list does not confer special statutory protection on those species that are listed on it.

Conservation codes for Declared Rare Flora and Priority Flora in Western Australia

R and /or T	Declared Rare Flora – Extant Taxa – Taxa which have been adequately searched for and are deemed to be in the wild either rare, in danger of extinction, or otherwise in need of special protection, and have been gazetted as such.
X	Declared Rare Flora – Presumed Extinct Taxa – Taxa which have not been collected or otherwise verified over the past 50 years despite thorough searching, or of which all known wild populations have been destroyed more recently, and have been gazetted as such.
1	Priority One – Poorly Known Taxa – Taxa which are known from one or a few (generally < 5) populations which are under threat, either due to small population size, or being on lands under immediate threat, for example, road verges, urban areas, farmland, active mineral leases, or the plants are under threat, for example, from disease, grazing by feral animals. May include taxa with threatened populations on protected lands. Such taxa are under consideration for declaration as rare flora, but are in urgent need of further survey.
2	Priority 2 – Poorly Known Taxa – Taxa which are known from one or a few (generally < 5) populations, at least some of which are not believed to be under immediate threat (that is, not currently endangered). Such taxa are under consideration for declaration as rare flora, but are in urgent need of further survey.
3	Priority 3 – Poorly Known Taxa – Taxa which are known from several populations and are not believed to be under immediate threat (that is, not currently endangered), due to the number of known populations (generally > 5), or known populations being large, and either widespread or protected. Such taxa are under consideration for declaration as rare flora but are in need of further survey.
4	Priority 4 – Rare Taxa – Taxa which are considered to have been adequately surveyed and which, while rare (in Australia), are not currently threatened by any identifiable factors. These taxa require monitoring every 5 to 10 years.
C	Common Taxa – Taxa no longer under threat.

The Rare Flora and Priority Flora lists are reviewed regularly and changes are recommended to the minister by the Threatened Species Scientific Committee. The latest lists should therefore be consulted. The current *Wildlife Conservation (Rare Flora) Notice* is on the DEC website, and DEC may be consulted for priority species.

Surveys for Declared Rare Flora and Priority Flora

This section provides advice to assist surveys for Declared Rare Flora and Priority Flora.

In the first instance, an indication of the rare and priority species in a locality may be gained by seeking information from DEC's databases.

DEC maintains three complementary databases which may provide helpful information on Declared Rare Flora and Priority Flora. These are the Threatened (Declared Rare) Flora database, the Priority Species List, and the Western Australia Herbarium Specimen database.

Information and printouts may be provided by DEC, subject to conditions and payment of a fee. To provide information, DEC requires the geographical co-ordinates of the area of interest. It is not acceptable to use old printouts from DEC as the lists and databases are subject to continual updating and amendment.

Information from DEC's databases will provide an indication of Declared Rare and Priority Flora that have been identified in the general area, and assist in the development of a target list for site surveys.

For information on a particular site, field investigations by a botanist are generally required to accurately determine the occurrence of Rare and Priority Flora.

It is recommended that DEC is consulted before surveys are carried out, and that the Declared Rare Flora and Priority Flora search includes the following three stages:

1. preparation for field work, including familiarisation with the appearance of the flora to be searched for, and its possible habitats
2. fieldwork to search for the Declared Rare Flora and Priority Flora and habitat of the Declared Rare Flora and Priority Flora. To locate some Declared Rare Flora and Priority Flora the timing of the survey will be crucial. Repeat surveys over different years will be required for some species, for example, orchids.
3. identification and confirmation of the identity of plants observed and/or collected during the fieldwork.

It is expected that the report on the field work will describe and locate any Declared Rare Flora and Priority Flora actually found, and discuss the possibility of other Rare Flora occurring on the subject site including the basis of this discussion, for example, proximity to other populations, similar habitat, similar vegetation.

Further guidance is provided in EPA Guidance Statement No. 51 *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004d).

In relation to development projects, a survey for Declared Rare Flora and Priority Flora will need to be part of more comprehensive biological survey work.

What to do if Declared Rare Flora and Priority Flora are present

Where Rare Flora or Priority Flora are found within an area subject to a development proposal, the proposal should be referred to DEC with a description of the management measures proposed to protect the flora. These may include conservation covenants and open space reserves.

Where Rare Flora is proposed to be taken, a submission to DEC is required to seek ministerial permission to take Rare Flora. DEC should be consulted for matters to include in the submission.

These include a discussion on alternatives to taking the Rare Flora, and the relative impact of the taking on the conservation status of the species at the site, or regionally where the species will be significantly compromised in the local situation. Where adequate protection is not proposed, DEC may choose to refer the proposal to the EPA.

Proponents also have a responsibility to comply with the requirements of the *Environment Protection and Biodiversity Conservation Act 1999*. Triggers for the Commonwealth environmental assessment process include but are not limited to actions that impact on nationally threatened species.

Threatened Ecological Communities

Threatened biodiversity conservation strategies were traditionally aimed at species. Now they also include ecological community conservation.

1. In Western Australia, threatened ecological communities are assessed through a procedure coordinated by DEC and are assigned to one of the following four categories:
2. presumably totally destroyed – an ecological community that has been adequately searched for but for which no representative occurrences have been located
3. critically endangered – an ecological community that has been adequately surveyed and is found to be facing an extremely high risk of total destruction in the immediate future
4. endangered – an ecological community that has been adequately surveyed and is not critically endangered but is facing a very high risk of total destruction in the near future
5. vulnerable – an ecological community that has been adequately surveyed and is not critically endangered or endangered but is facing a high risk of total destruction or significant modification in the medium to long-term future.

Most threatened ecological communities are naturally restricted in distribution, or were once widespread but now occur only as remnants in cleared landscapes. A widespread ecological community may be listed as a threatened ecological community if information is available to demonstrate that significant and widespread threats are active across its range.

At May 2005, 110 ecological communities had been entered into DEC's threatened ecological community database. Of these, 21 had been endorsed by the Minister for the Environment as critically endangered, 17 as endangered, 28 as vulnerable and 3 as presumed totally destroyed. The remainder of the communities on the database are considered priority communities. These are possible threatened ecological communities that do not meet survey criteria or are not adequately defined.

In Western Australia, potential impacts to threatened ecological communities are considered by agencies such as the EPA, DEC and planning agencies when they evaluate applications to clear or develop land. Legal protection of identified threatened ecological communities may then be provided under the Acts administered by some of these agencies.

Proposed impacts on communities listed as nationally threatened under the Commonwealth's *Environmental Protection and Biodiversity Conservation Act 1999* are also subject to the Commonwealth environmental impact assessment process.

Attachment B2-2

How much vegetation should be retained?

In recent times, researchers have looked into the question of how much native vegetation must be retained to enable the biodiversity and the ecosystem services that the biota provides to be self-sustaining. Some of the findings reported in EPA (2000a) are discussed below.

It appears that ecosystems experience species losses that accelerate exponentially when clearing causes the remaining native vegetation to dip below a level of 30% of the pre-clearing extent of the vegetation type.

However, it is estimated that to maintain the hydrological function of vegetation most of the agricultural area in the South West of the state would need to retain deep-rooted vegetation at a level in the order of 60% to 70%.

From a purely biodiversity perspective, a level of 10% of the original extent of a vegetation community is regarded as being a level representing 'endangered'.

To maintain biodiversity, the size of bushland remnants and their connectivity are important considerations. Small remnants are more prone to edge effects. Native vegetation on the edges or near cleared or disturbed land is prone to weed infestation, pests and diseases, increased exposure to the weather, changed drainage and watertable regimes, trampling and other impacts. Fragmentation of native vegetation affects the long-term continuance of some flora species, ecological communities and native fauna. Fauna need sufficient areas of accessible native vegetation to provide food through adverse seasons, shelter, camouflage and protection from predators, breeding and nursery sites, variety in gene stock to avoid in-breeding, and recruitment of species after fire.

The values of bushland fragments are likely to be enhanced when linked by corridors with native vegetation. 'Stepping stone' linkages will have value in some instances.

Attachment B2-3

Areas of high conservation significance in the Perth Metropolitan Region (Swan Coastal Plain portion)

In the Swan Coastal Plain portion of the Perth Metropolitan Region (that is, the Bush Forever study area shown in Figure B2), the Environmental Protection Authority considers that the native vegetation and flora in the following areas is of high conservation significance and is a priority for protection:

- Bush Forever sites (Government of Western Australia 2000b, refer to the Draft State Planning Policy *Draft Bushland Policy for the Perth Metropolitan Region Scheme 2004* available from www.wapc.wa.gov.au)
- portions of vegetation complexes where less than 10% of the complex remains in the Bush Forever study area (for example, most complexes of the eastern side of the Swan Coastal Plain), and some vegetation in those complexes where the regional reserves system will not protect 10% of the original area of the complex (for example, the Karrakatta Complex—Central and South). See Table 4 in Government of Western Australia (2000b)
- conservation category wetlands and their buffers, and coastal foreshores
- areas that form part of an ecologically significant linkage between conservation areas
- areas with Declared Rare and Priority Flora, habitat that supports threatened fauna, threatened ecological communities as listed by the Department of Conservation and Land Management, or native vegetation, flora or fauna that is for any other reason of exceptional environmental value having regard for the advice of relevant government agencies and experts.

Attachment B2-4

Preparing a management plan for a natural area

This attachment provides an example of items to include in an environmental management plan for a natural area. An alternative format is in Attachment B4-5.

1.0 Summary of management commitments/recommendations

2.0 Introduction

Outline reason/s for preparing management plan and overall objectives.

3.0 Description of the site and context

Describe the following and use maps to illustrate (keep this section concise and specific):

- site location and name, site ownership
- regional and local context of the site. Include relevant 'sense of place' information (see Seddon 1972)
- zoning and planning considerations
- regional, sub-regional or catchment plans that may be relevant to the development of the management plan
- legislation and policy directly relevant to the site, including *Wildlife Conservation Act 1950*, Environmental Protection (Swan Coastal Plain Lakes) Policy, Bush Forever
- history including Aboriginal and European significance
- current use of site and adjoining land, and structures on the site
- current management
- access
- physical and biological attributes and values, and threats to these
 - biological features – including vegetation units/ecological communities (including any threatened ecological communities), flora and fauna (including any threatened or unusual species), vegetation condition (based on a recognised methodology), fauna habitat, weeds and pests, diseases (for example, dieback). Identify rehabilitation areas/ problem areas
 - role in maintaining ecological linkages (wildlife corridors)
 - geomorphology/landforms, water bodies and natural features
 - wetland type if applicable and wetland management category (based on latest DEC mapping or agreed with DEC)
 - landscape values
 - soils and their characteristics. (Note any disturbance and potential for degradation, for example, erosion, acid sulfate soil, fill, soil amendment)
 - hydrology, including the surface and groundwater regime, water quality, pollution risk, drainage catchments
 - meteorological conditions (useful if revegetating), for example, prevailing winds, likelihood of frost
 - fire history and susceptibility
 - any other relevant attributes and threats
- the significance of each of the attributes of the site, the site overall, and any adjoining open space. Consider significance in terms of the local, regional, national and international levels.

4.0 Issues

Summarise the issues specific to the site, for example, conservation, ecological linkage, recreation, stormwater management, water quality, fire management, flooding, heritage issues, reserve boundaries, mosquitoes and midges, dieback, weeds, utility services and corridors, introduced fauna, feral animals, education, visual amenity, vandalism, trampling, liability and risk from community use. Take into account regional issues as well as local ones.

5.0 Management aim and objectives

Outline management objectives for the subject site. Consider objectives for each site-specific issue. It may be appropriate to split the site up into management 'zones'.

6.0 Management responsibilities

Identify:

- the management agency or agencies, and clarify if different to the site owners
- the overall coordinator who will implement the individual management actions
- whether working groups/volunteer groups/other organisations will be involved, and their role.

7.0 Management actions

Outline management actions to achieve the objectives. Consider:

- conservation/enhancement of natural attributes and processes
- protection/enhancement of other compatible values (recreational, scientific, educational, aesthetic, cultural, heritage and commercial), and resolution of any potential conflicts between different objectives/ uses
- repair of degraded areas
- detailed planting/landscaping plan including source and types of seed (addressing provenance), plants, mulch, soil, and other materials, propagation methods, fertilisation and irrigation if appropriate, topsoil management, mulching and soil stabilisation (minimising disease risk), planting schedule, planting density, seedling maintenance
- weed control/eradication outlining chemical, biological and manual methods of removal and weeding schedule
- native fauna reintroduction
- disease control (for example, prepare and implement dieback management plan) and pest management
- fire management, location of firebreaks, consultation with relevant authorities, access for fire fighters, education of local community
- stormwater management and protection of the hydrology of the site
- access and facilities – consider walk trails, entry points, vehicular access for the public, access for maintenance vehicles, access for emergency vehicles, access and facilities for people with disabilities, access and facilities for dog walkers, boardwalks, bridal trails, rubbish bins, seating, signage, toilets, water taps, carparks, picnic facilities, food facilities, lighting, educational facilities (for example, interpretive signage), perimeter and internal fencing, turn stiles, fire breaks, monitoring stations/areas (groundwater monitoring bores)
- control of any undesirable existing and potential site characteristics, uses and activities (including feral animals, unauthorised vehicles, rubbish)
- any other site specific management actions to achieve objectives
- maintenance
- timing and implementation schedules having regard for the prioritisation of management objectives, seasonal determinants, funding and receiving necessary approvals from relevant authorities.

8.0 Diagrammatic management plan

Include a detailed diagrammatic management plan, preferably based on up-to-date aerial photography.

9.0 Funding and resources

Outline the funding arrangements for the management of the site, and any other resources available, for example, volunteer groups.

10.0 Monitoring and response

Identify:

- key attributes which will be monitored to ensure management objectives are met
- criteria for these attributes (performance criteria) that will trigger a management response
- monitoring program
- reporting procedures
- procedures/management response, in the event that the trigger values for a management response are recorded, for example, water pollution contingency measures.

11.0 Other elements of environmental management plan

Consider the following:

- involvement and communication with the community and stakeholders, in accordance with a consultation
- program
- obtaining any approvals that may be required for management works
- procedures for adoption and review of the management plan
- the term of the plan (five or 10 years usually)
- procedures for the interim evaluation of the management plan.

Further reading

Seddon, G. 1972 *Sense of Place: A Response to an Environment, the Swan Coastal Plain Western Australia* University of Western Australia Press, Nedlands, Western Australia.

Tizard, B. 2000 *Reality, Dreams and Pathways: A Manual for Preparing and Implementing Management Plans* Armadale Settlers' Common Field Study Centre and Ecoplan, Perth.

Water and Rivers Commission 2001a *Planning for Waterways Management: Guidelines for Preparing a River Action Plan* River Restoration Series, Water and Rivers Commission, Perth.

Waterways Commission 1994 *Guidelines for the Preparation of Foreshore Management Plans in Waterways Management Areas – a Guide to Proponents* Government of Western Australia, Perth

Chapter B3

Native terrestrial fauna

B3.1 SIGNIFICANCE OF NATIVE TERRESTRIAL FAUNA

The *State of the Environment Report* (Government of Western Australia 1998a) states that maintaining biodiversity is an issue of the highest priority for government and community action in Western Australia. Native fauna are an integral part of the State's rich biodiversity and they play an essential role in maintaining the balance in ecosystems (Attachment B3-1). They are also valued by the community for cultural, heritage, economic, recreational, educational, and scientific reasons. This makes protecting and managing native fauna important issues for Western Australia.

Other chapters that provide information relevant to the protection of native fauna are B1 Biodiversity and natural areas, B2 Native terrestrial vegetation, B5 Wetlands, B6 Waterways and B9 Karst, subterranean wetlands and fauna.

B3.1.1 LAND USE PLANNING AND FAUNA ISSUES

Decision-making during land use planning and development can heavily impact on native fauna and its habitat. The issues that arise from the clearing of native habitat and the displacement of native fauna include, but are not limited to, the following:

- a decline in regional biodiversity
- a loss of local biodiversity compounding to contribute to a loss of regional biodiversity
- a loss of genetically different material leading to a loss of potential for new speciation (Possingham & Field 2001)
- a decline in the ecosystem services provided by some fauna that may contribute to a chain reaction involving loss of other species of plants and animals, and a loss of stability in the ecosystem
- a change in the composition of fauna, being of particular concern where the proportion and population size of non-indigenous species increases
- fewer recreation opportunities (for example, fishing, bird watching, nature watching)
- fewer economic opportunities (for example, tourism opportunities that rely on regular sightings of particular native fauna)
- less ability for communities and individual people to practice traditional activities and to experience native fauna in ways of cultural, spiritual, aesthetic or personal significance
- a decline in a resource of scientific or educational value
- a loss or decline of a local fauna icon
- a decline in the resources, opportunities and natural diversity available to future generations
- concerns about the protection of property, agricultural crops and personal safety.

TERMS

Terrestrial fauna are animal species living in or on land. For the purposes of this chapter, freshwater vertebrates including fish and amphibians and aerial species are included. Marine fauna and subterranean fauna are not addressed in this chapter.

Significant fauna include but are not necessarily limited to species protected by international agreements or treaties (for example, JAMBA and CAMBA migratory bird agreements), Specially Protected Fauna, Priority Fauna, short range endemic species, species with declining populations or declining distributions, species at the extremes of their range, isolated outlying populations and undescribed species. Introductory information on Specially Protected and Priority Fauna and the migratory bird agreements is in Attachments B3-2 and B3-3.

A **fauna assemblage** is a collection of animal species inhabiting a particular area.

Habitat is the natural environment of an organism or a community, including all biotic and abiotic elements. The term habitat can be applied at a range of scales. Vegetation can be a reasonable surrogate for outlining habitat when its main components, structure and the associated landform are also described.

(EPA Guidance Statement No. 56 EPA 2004f)

As land use planning has a considerable impact on native fauna in some locations, it is relevant for those involved with planning to have an overview of knowledge on fauna including functions of fauna and threats to fauna. Attachment B3-1 provides some introductory information on native fauna. Attachment B3-4 discusses the issue of how much land is required to support native fauna.

B3.2 EPA'S BROAD PRINCIPLES FOR THE PROTECTION OF NATIVE TERRESTRIAL FAUNA

EPA's objective

The EPA's objective for native fauna is to maintain the abundance, diversity, geographic distribution and productivity of native fauna at the species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge (EPA 2004f).

The broad principles of the Environmental Protection Authority (EPA) relevant to land use planning and the protection and management of native terrestrial fauna include the following:

Protect and manage adequate natural areas

Native fauna is best conserved in-situ and by keeping each **ecological community** above the **threshold** level at which species loss appears to accelerate exponentially. This means retaining most ecological communities above 30% of their pre-clearing level in a region by:

- establishing a comprehensive, adequate and representative system of conservation reserves
- maintaining and rehabilitating fauna habitat outside the reserves system
- managing all land use and development within a region with a view to meeting overall biodiversity and fauna protection objectives.

All native habitats which significant fauna rely on for their survival should be protected.

The areas of highest conservation significance for native fauna that should be fully protected are identified in B3.2.2. Additional fauna habitat will also need to be retained to meet the community's objectives as outlined in B3.2.3.

The protection of fauna is best achieved by retaining some large, relatively intact bushland areas with a variety of habitat types. Retaining small areas of native habitat is also of value as this may enable the continuation of some species.

The values of large and small areas of native habitat are enhanced by maintaining and enhancing ecological linkages between these areas.

Having regard for the importance of maintaining biodiversity and the difficulty in reversing biodiversity declines, impacts on native habitat, particularly clearing, should be avoided wherever possible.

Adopt an ecosystem management approach

It is more effective and efficient to adopt an ecosystem management approach to maintaining fauna numbers and species and interdependent fauna assemblages than to manage species on a species by species basis.

Adopt environmentally sound management practices

It is important to design and manage land use and development to avoid direct and indirect adverse impacts on key native fauna and fauna habitat. This includes monitoring and adapting to new information.

Development should not result in species extinction

Development should not result in the extinction of any species of animal, nor the demise of any association or community of indigenous plants and animals. Significant fauna species should not be subjected to risks that may increase any threats to their survival as a result of development.

Adopt an integrated and consultative approach

The EPA supports the development of regional strategies for the protection of key fauna and biodiversity values, and the integration of land use planning with regional biodiversity protection measures.

Strategies that address biodiversity protection should consider the elements of the EPA's natural resource management framework as outlined in EPA Position Statement No. 8 (EPA 2005a).

During the formulation of a planning strategy or project that may impact on significant native fauna and fauna habitat, consultation should be carried out with all relevant parties, for example, the Department of Environment and Conservation, the Western Australian Museum, the Commonwealth Department of Environment and Heritage, natural resource managers, interest groups and fauna experts. An indicative list of relevant agencies is provided in Table B1.

The EPA prefers that development proposals appropriately reflect the outcomes of the consultation process.

Obtain adequate information to allow informed decision-making

Projects likely to have a significant impact on native fauna or fauna habitat require adequate research and survey work that identifies the fauna, fauna habitat and relevant fauna characteristics, the likely scale and nature of impacts on the biota, and the significance of the biota, its ecosystem setting and impacts. This allows informed decision-making by proponents and authorities.

Mitigating the impacts

Projects that propose significant impacts on the environment should demonstrate that they address the mitigation of impacts through considering the following (in order of preference, as set out in Position Statement No. 9 *Environmental Offsets* (EPA 2006a):

- avoidance of adverse impacts
- minimisation of adverse impacts
- rectification through repair and restoration of impacted sites as soon as possible
- reduction and elimination of adverse impacts over time
- offsets carried out to counterbalance adverse impacts (at a distance from the impacted site).

B3.2.1 EPA'S PUBLISHED POSITION

The following documents set out the EPA's published position on aspects of native fauna and fauna habitat protection. Environmental protection policies are statutory documents.

Environmental protection policy

- *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002* (see Attachment B3-5)

Position statements

- *Terrestrial Biological Surveys as an element of Biodiversity Protection* Position Statement No. 3 (EPA 2002a)
- *Environmental Protection and Ecological Sustainability of the Rangelands in Western Australia* Position Statement No. 5 (EPA 2004c)

Guidance statements

- *Guidance for the Protection of Tropical Arid Zone Mangroves along the Pilbara Coastline* Final Guidance Statement No. 1 (EPA 2001a)
- *Level of Assessment for Proposals Affecting Natural Areas within the System 6 Region and Swan Coastal Plain Portion of the System 1 Region* Final Guidance Statement No. 10 (EPA 2006b)
- *Guidance Statement for Assessment of Development Proposals in Shark Bay World Heritage Property* Final Guidance Statement No. 49 (EPA 2000b)
- *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* Final Guidance Statement No. 56 (EPA 2004f)
- *Guidance Statement for Environmental Offsets* Draft Guidance Statement No. 19 (EPA 2007c)

B3.2.2 AREAS OF HIGH CONSERVATION SIGNIFICANCE

The EPA considers the natural areas listed in Chapter B1 to be areas of high conservation significance that must be fully protected in Western Australia. The native fauna and fauna habitat associated with these areas is of high conservation importance (with the exception of the few subcategories that clearly do not relate to fauna). The EPA is unlikely to recommend the approval of projects that have significant adverse impacts on these areas.

These key areas for native fauna include but are not limited to:

- representative areas of all ecological communities (see B2.2)
- areas on which the following significant fauna rely:
 - specially protected and priority fauna (see Attachments B3-2)
 - migratory species protected by international agreements (see Attachment B3-3)
 - habitat specialists with limited distribution in the region
 - wide-ranging species with declining populations in the region or declining distributions (there is a list of birds in the above two categories on the Swan Coastal Plain portion of the Perth Metropolitan Region in Bush Forever volume 2 (Government of Western Australia 2000d))
 - species at the extremes of their range or isolated outlying populations
 - undescribed species
 - short-range endemics
- quality ecological linkages between conservation areas of regional or higher significance.

B3.2.3 OTHER AREAS IMPORTANT FOR FAUNA

In addition to the protection of the above areas, it is necessary to retain, restore and appropriately manage additional areas of fauna habitat on private land and in reserves to meet the state's objectives for biodiversity protection.

The EPA recommends that in each locality, areas of fauna habitat area are identified for protection and appropriate management based on a study of the fauna of the region. Consideration of areas to be protected should include but not be limited to the following guidelines:

- avoid the disturbance of native habitat
- retain adequate representative areas of all ecological communities
- retain areas with a locally high diversity of fauna species and/or range of ecological communities
- retain the areas with the best quality habitat
- retain native vegetation and fauna habitat where it is scarce, and where it may help sustain threatened species and species of special interest
- retain areas that support populations of a locally declining species
- protect wetland, waterway and coastal foreshore buffer areas
- retain connected sequences of ecological communities
- maintain ecological linkages between key habitat areas
- retain a number of large compact bushland areas, where possible
- retain areas of native fauna habitat valued by the community for cultural, recreational, educational or other reasons
- retain areas identified through regional and local strategic and structure planning procedures, and site-specific assessments, for the retention or restoration of native habitat
- near key areas of fauna habitat, position and manage land uses so as to avoid adverse effects on the conservation values of the habitat (for example, maintain buffers).

In some cases, in urban areas, non-native habitat may have a role in meeting some of the community's objectives for native fauna. The issue of how much land is required to support native fauna is discussed in Attachment B3-4.

B3.3 CONSIDERING NATIVE FAUNA DURING PLANNING

Planning decision-making is an important activity that influences outcomes for native terrestrial fauna. The EPA considers that the community's overall goals for sustainable development are more likely to be successfully achieved when fauna, together with other aspects of biodiversity, are considered as early as possible in the planning process for a particular region or site.

Each planning authority is urged to be aware of the biological information that is available for the region. Department of Environment and Conservation (DEC), FaunaBase on www.museum.wa.gov.au, natural resource managers, and references in Part E may provide an initial guide to available information.

The level of available biological information for a region will have a bearing on the level of biological survey and analysis needed to support planning strategies, zonings, and subdivision and development applications. Where significant impacts on native fauna and fauna habitat are likely, it is recommended that decision-makers ensure that they have sufficient information on each of the items listed in the checklist below to allow informed decision-making. For some project areas and species for which there is limited information, the information that zoologists are able to provide in the short term may also be limited. In these instances, a precautionary approach to the clearing of native habitat is urged.

CHECKLIST FOR COMPREHENSIVE REPORTING ON NATIVE FAUNA ISSUES

It is recommended that applicants and decision-makers consider this checklist when significant impacts on fauna are likely and full evaluation of native fauna issues is appropriate. This set of actions will assist the preparation of a comprehensive report to accompany a structure plan or major development project.

- ☐ Set the context
 - Describe the characteristics of the existing environment of relevance to fauna including but not limited to habitat types (map), any special landform characteristics, existing land uses (map), fragmentation/connectivity of habitat, habitat condition, the regional context.
 - Identify the available sources of fauna information (including reports of environmental work carried out in the local area and the region, and the available metadata, for example, WA Museum FaunaBase).
 - Describe results of consultation with government agencies, experts, organisations, the community.
- ☐ Identify key policies and strategies that apply to the protection of fauna in the area, for example, biodiversity strategy, land use planning strategies and policies, natural resource and catchment management strategies, DEC initiatives.
- ☐ Identify any fauna survey work carried out for the current planning project and its specific aims, methodology and limitations.
- ☐ Identify fauna species and fauna assemblages having regard for seasonal and intermittent visitors. Describe key fauna characteristics, the habitat requirements of the fauna, and the role of the habitats in the study area, for example, important feeding or breeding area.
- ☐ Identify key environmental values, issues, threats/pressures associated with the fauna of the study area.
- ☐ Identify the significance of fauna species using and likely to use the study area, fauna assemblages, and natural areas in the study area, having regard for the international, national, state, regional and local levels of significance. Indicators of significance include but are not limited to rarity (for example, threatened ecological communities, Specially Protected and/or Priority Fauna, short range endemics), species and areas subject to international agreements (for example, **Ramsar** wetlands and migratory birds agreements), ecological refuges for fauna species, species richness, diversity of habitats/landforms, maintaining ecological processes, maintaining representative areas of all ecological communities, ecological linkage, heritage and other values. Indicate if insufficient information exists to fully address significance.

continued...

CHECKLIST FOR COMPREHENSIVE REPORTING ON NATIVE FAUNA ISSUES

- ☐ Propose objectives for fauna, and targets for protection (as appropriate for the project area).
- ☐ Identify potential impacts/threats/pressures as a result of the planning project and likely future development in the region, on the environmental values and objectives associated with fauna.
- ☐ Having regard for the environmental objectives for fauna, set out strategies for the protection of fauna species and assemblages (for example, protection of key habitat areas and ecological linkages, protection of targeted species). Identify if further information on fauna is required and when it should be provided.

NB: EPA Guidance Statement No. 56 (EPA 2004f) provides advice on designing and carrying out terrestrial fauna surveys for projects subject to environmental impact assessment. Useful references for survey methods are in EPA Guidance Statement No. 56 on page 13. In most instances, the survey area will need to be larger than the project area to provide appropriate context.

B3.3.1 BROAD SCALE PLANNING

Section A1.4.1 provides a generic checklist of procedures to use when considering native fauna during broad scale planning. It points to the need to consider preparing overarching environmental strategies to assist the formulation of strategic plans and schemes in environmentally sensitive areas facing development pressures.

A comprehensive biodiversity strategy for a region will usually provide the most appropriate basis for strategic and subsequent planning decision-making in areas likely to be subject to development pressures. The biodiversity strategy should identify the location of key natural areas to be protected and document how these areas will be secured, managed and integrated with other processes, particularly planning processes. Guidance on how to prepare a biodiversity strategy for localities in the Perth metropolitan area is provided in *Local Government Biodiversity Guidelines for the Perth Metropolitan Region* (Del Marco et al. 2004).

B3.3.2 LOCAL AREA PLANNING

A generic checklist of procedures applicable to the consideration of native fauna during detailed planning and decision-making on development projects is in A1.4.2.

To allow informed decision-making by the applicant and the authorities, a project that is likely to directly or indirectly impact on native fauna and fauna habitat will usually require supporting documentation on the following:

- fauna habitat types
- the fauna likely to use the site
- key characteristics of the fauna, for example, habitat requirements of the fauna
- the significance of the fauna and fauna habitat at each level (that is, international, national, regional and local)
- the likely scale and nature of impacts on the fauna
- how impacts on fauna will be managed to meet the community's biodiversity protection objectives. It is recommended that initial studies include the items in the checklist below.

CHECKLIST FOR INITIAL FAUNA STUDIES

- ☐ Consult fauna references, databases, and key agencies/organisations/experts, to identify species that may potentially use the site, and whether they are of special interest.
- ☐ Specifically research the potential for **threatened fauna** and migratory species protected under international agreements (JAMBA and CAMBA) to use the site.
- ☐ Carry out preliminary site inspections.
- ☐ Identify local and regional policies and strategies, as applicable, that address the protection of fauna in the area, for example, DEC, biodiversity protection, land use planning, natural resource management or other policies and strategies.
- ☐ Identify the significance of any natural area on the site, including its value as ecological linkage (see Chapter B1).

Where the above work indicates that a proposed development site has the potential to be of significance for its fauna or fauna habitat, more detailed surveys and investigations should be carried out by suitably qualified personnel. EPA Guidance Statement No. 56 (EPA 2004f) provides advice on the level of survey work, background research and reconnaissance surveys. If a project is to be formally assessed by the EPA, the EPA may specify project-specific requirements for work to be carried out.

Field surveys must be well-designed and tailored to the particular project. It is generally recommended that the planning decision-maker sights evidence from an independent accredited source (for example, government agency or suitably qualified auditor) that the survey is suitably designed and that the findings are adequately supported.

It is not advisable to defer survey work until late in the project design phase. Many fauna species require large areas of land and have specific habitat requirements. Due protection of significant fauna species and habitat may, in some cases, considerably impact on any eventual site layout and site management.

The checklist in B3.3 provides guidance on reporting on native fauna issues when significant impacts on fauna are likely.

B3.3.3 MEASURES TO PROTECT FAUNA

Where the protection of native fauna or fauna habitat is indicated, measures that assist in pursuing fauna, biodiversity and related objectives include, but are not limited to, the following:

- Avoid development in areas of natural native fauna habitat.
- Set aside land for conservation or multiple use open space purposes. Consider establishing reserves and encouraging conservation covenants on areas of significant habitat.
- Impose and enforce conditions of approval or scheme provisions that, depending on the particular circumstances, may require:
 - baseline survey for the purposes of ongoing monitoring and management
 - the preparation and implementation of a management plan for particular fauna habitat or species. An example is provided below
 - restoration or creation of fauna habitat in defined locations, for example, through revegetation and/ or the provision of habitat elements such as protective cover, roosting or nesting sites. Consider requirements of targeted species
 - fencing, for example, dog proof fencing, and control of access
 - predator and/or disease control
 - the management of potential pollutants, for example, management of stormwater pollutants through the implementation of a water management plan
 - a fire management plan
 - vegetated (or rehabilitated) buffers, for example, adjoining conservation areas
 - the collection of specimens and relocation of species, but only if supported by relevant agencies, for example, DEC, and in compliance with all legislative requirements
 - provision of ecological linkages.

EXAMPLE OF A CONDITION OF APPROVAL

1.0 Waterbird Management Plan

- 1.1 Prior to the responsible authority granting final approval of the Outline Development Plan, a Waterbird Management Plan shall be prepared by the developer for areas of and adjacent to important waterbird habitat, to the requirements of the responsible authority on advice of DEC.
- 1.2 The plan will be prepared to provide ongoing protection for waterbirds and their associated habitat and will address:
 - 1 proposed monitoring programme to identify waterbird utilisation of the areas of important waterbird habitat, including patterns of roosting, nesting, feeding and mating;
 - 2 general management measures relating to the management of the impacts of construction on waterbirds to be applied in the event that the monitoring programme finds important waterbird habitats; and
 - 3 general management measures relating to the management of the impacts on waterbird after the construction phase, resulting from pedestrians, domestic pets, vehicles and boats in the event that monitoring programme finds important waterbird habitats, including the following measures:
 - 1) limitation of human access to sensitive portions of the foreshore
 - 2) control of vehicles by physical barriers
 - 3) public education to increase awareness of the sensitivity of the conservation areas
 - 4) adequate sign posting to define exercise areas for horses and dogs
 - 5) control of feral animals where practicable and
 - 6) improvement of conservation practices.
- 1.3 The Waterbird Management Plan shall be subsequently implemented in accordance with the requirements of the plan.

B3.4 REFERRAL TO THE EPA

This section should be read in conjunction with the general referral requirements for schemes in A3.2.1 and for proposals in A4.2.1.

B3.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

With respect to the biophysical factor 'native terrestrial fauna', referral of a proposal to the EPA pursuant to s38 *Environmental Protection Act 1986* should be considered if Specially Protected and Priority Fauna, or other significant fauna or fauna assemblages, or their habitat, are likely to be adversely affected.

Prior to any referral on the basis of impacts on fauna, the EPA expects that DEC and other relevant agencies or experts will be consulted. In the case of a potential impact on a Bush Forever site, the advice of the Bush Forever Office, Department for Planning and Infrastructure (DPI) should be sought.

Where it is unlikely the proposal will be adequately managed through the planning process, or through the application of the *Wildlife Conservation Act 1950*, or other legislation, having regard for the advice from relevant agencies and experts, referral of the proposal to the EPA is generally indicated.

It is noted that the EPA's objectives for the protection of fauna are largely achieved through the protection of areas of native vegetation, wetlands, waterways and other areas of environmental significance, in accordance with the advice provided in other chapters in Part B of this guidance statement.

B3.4.2 INFORMATION TO ACCOMPANY A REFERRAL

The detail of information on native fauna that is sufficient for the EPA to set the level of assessment on a referral of a scheme or proposal will vary depending on the location and nature of the scheme or proposal.

Basic helpful information on a referral for a scheme or proposal that may impact on native fauna or fauna habitat, includes:

- an aerial photo on which the proposal/scheme area and key components of any proposed development and land use have been superimposed
- reference to any site-specific or regional investigations of fauna that have been carried out, or are proposed, having regard to the advice in EPA Guidance Statement No. 56 (EPA 2004f)
- details of the potential impacts of the proposal on fauna and fauna habitat, for example, the proposed extent of any clearing of fauna habitat, the type of any habitat that may be impacted, and the extent to which the habitat type persists in the region and is represented in conservation reserves
- management measures proposed to mitigate the potential impacts on fauna and its habitat, including the site layout and the proposed scheme provisions or expected conditions on subdivision or development
- other approvals that may be required, for example, approval under the *Wildlife Conservation Act 1950* or the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999*
- results of any consultation carried out, for example, the comments of DEC, and, in the case of a potential impact on a Bush Forever site, the comments of the DPI Bush Forever Office.

Where possible, please assist the EPA by providing all relevant data in digital and GIS format.

Attachment B3-1

Fauna in Western Australia – some characteristics, functions and threats

Characteristics

Western Australia has a rich fauna but it is not as well studied as the flora. The vertebrate groups are the best documented with an estimated 3,237 species (FaunaBase on www.museum.wa.gov.au). However, in some groups (especially fishes, frogs and reptiles) entirely new species are described almost every year (EPA 2004f citing Aplin et al. 2001).

Although **baseline** knowledge on fauna is patchy, for some species and regions detailed studies have been carried out and broad trends have been identified. Some of these trends are outlined below:

- Where extensive changes to the original environment have occurred, many species of native fauna, and the numbers within species, have declined or are declining over time within broad regions. Saunders (1989), Saunders & Curry (1990) and Saunders & Ingram (1995), for example, have documented the decline in birds across the agricultural zones of southern Western Australia. How & Dell (1993, 2000) have documented the decline in all vertebrate groups on the Swan Coastal Plain.
- The decline in the number of indigenous species and the population of each species in many local areas leads to concerns about the regional and wider loss of species and the ecosystem functions the species provide.
- Habitat changes associated with development are such that some native species may persist, or even substantially benefit. In some areas, native species now widespread, for example, the Galah, are known to out-compete local specialist species, contributing to the decline of the specialist species.
- Some faunal groups have a high level of endemism to Western Australia (Hopper et al. 1996). Short-range endemism is an important characteristic of some areas (Harvey 2002).
- Fauna management criteria that are based on Northern Hemisphere research are often not applicable to Australia. Many of our fauna species are characterised by long-lived individuals that may produce few offspring at long intervals and require large ranges.
- Native fauna is more likely to persist where large areas of native habitat are retained. Because of its low productivity, much native habitat has a low carrying capacity for native fauna species. A small population restricted to an area that is not contiguous with other bushland is particularly vulnerable to such factors as drought and natural disasters, breeding irregularities, predation and lack of a source for recruitment of the species after a fire.
- While large areas of native habitat are crucial, smaller areas may also continue to provide habitat for some species and enable a range of ecosystem functions to persist (see Kitchener & How 1982, How & Dell 1994).

The functions of fauna

Two key aspects of fauna are generally recognised:

1. the functions performed by fauna species and fauna assemblages in maintaining ecosystems and the life-supporting services provided by ecosystems
2. the characteristics of individual fauna species and species assemblages, and the diversity of fauna species.

Arguably, the most significant of these aspects is the role performed by native fauna species and assemblages as an essential and integral part of ecosystem functioning. In this regard fauna performs a role in:

- the cycling of material, through the browsing of flora, predation, the consumption of organic matter generally, excretion, death and decay
- the fertilisation and germination of plants. Some plants, for example, orchids (Hoffman & Brown 1992) are very reliant on specific fauna for their pollination

- maintaining the dynamic 'balance' in ecosystems. The balance between assemblages of plants, animals and diseases, and environmental elements such as fire, and soil structure and chemistry, can be destabilised by changes to any of the ecosystem components.

Threats to native fauna

By far the most significant cause of declines in many native fauna species is the loss, modification and degradation of native habitat, and its replacement with urban, agricultural, infrastructure or other land uses.

As land use planning and development may have a considerable impact on fauna in some locations, it is relevant for those involved with planning to be aware of the main processes that may endanger the long-term survival of some native fauna species.

Checklist of threats to native fauna

- loss and fragmentation of native habitat, and loss of ecological corridors
- a reduction in the size of bushland remnants and loss of quality habitat due to edge effects
- the loss of key habitat requirements, for example, loss of tree hollows and fallen branches that may be used as breeding or hiding sites; loss of proximity to the required combination of habitat types. For example, Carnaby's Cockatoo is threatened as it requires a combination of woodland for breeding and heath habitat types for feeding (both habitats have been extensively cleared)
- land degradation processes, for example, salinity. Salinity is expected to have a major impact on Wheatbelt frogs since most cannot successfully breed in saline water
- changes to groundwater and surface water regimes
- the loss of food sources, for example, loss of preferred plant species, and a decline in prey due to introduced predators
- the taking of useful native plant and animal species, associated with logging, collecting, hunting, fishing and similar activities
- the culling of species that may injure people or cause damage to property
- the introduction and spread of weeds that may supplant native habitat species. Both non-Australian and non-local Australian species may present problems
- the introduction and spread of plant and animal pathogens, for example, the chytrid fungus which is having a severe impact on frog populations (Tyler et al 2000)
- competition from, and overgrazing by, farm and feral herbivores and other animals, for example, rabbits, goats, donkeys, camels and honey bees
- the introduction and spread of feral predators, for example, foxes, cats, rats and dogs
- some artificial fire regimes
- the degrading of fauna habitat by trampling and damage caused by people and introduced animals
- accidental kills, for example, road kills and air strikes
- pollution, for example, air, land and water pollution, and its consequences, for example, global warming and ozone hole effects.

As fragmentation of native habitat is influenced by land use planning and development, it is relevant for those involved with planning to be aware of some of the reasons why fragmentation can cause problems for some native fauna.

Fragmentation is associated with a reduction in the size of areas of native habitat and separation of pockets of native habitat. Since much native vegetation has a low carrying capacity for native fauna species, a small population restricted to an area that is not contiguous with other bushland

is particularly vulnerable to drought, inbreeding and breeding irregularities (for example, seasons when male and female numbers differ greatly), local habitat changes over time, poor dispersal of local population booms, and lack of a source of recruitment following a disaster such as fire, flood or drought.

Fragments of native habitat are particularly prone to **edge effects**. The quality of the native habitat in fragments often declines, chain reactions set up, and over time many of the original species may disappear within the local and/or regional area.

Bushland remnants will by their nature also adjoin urban and other developed areas that represent habitat types different from the original habitats and consequently attract new species. The new habitats will benefit some species and ecological processes, but can adversely affect other species that were originally in the locality.

A discussion on how much bushland should be retained to support native fauna is in Attachment B3-4.

Attachment B3-2

Threatened fauna in Western Australia

Threatened fauna is protected in Western Australia under the provisions of the *Wildlife Conservation Act 1950*.

This attachment identifies the categories of threatened fauna used in Western Australia to support the *Wildlife Conservation Act 1950* and provides advice to assist surveys for the identification of threatened fauna.

Specially Protected Fauna in Western Australia

Under the *Wildlife Conservation Act 1950*, all native species of fauna in Western Australia are 'protected' unless otherwise declared, and cannot be captured or killed without a licence. Some threatened native fauna species are further declared to be 'fauna that is in need of special protection' under the Act. Threatened fauna listings are reviewed regularly and changes are recommended to the minister by the Threatened Species Scientific Committee. The list of specially protected fauna is published in a notice in the Government Gazette.

The *Wildlife Conservation (Specially Protected Fauna) Notice 2005* lists specially protected fauna in four schedules as follows:

Schedule 1 – fauna that is rare or likely to become extinct

Schedule 2 – fauna that is presumed to be extinct

Schedule 3 – birds protected under an international agreement

Schedule 4 – other specially protected fauna.

Threatened fauna listings are updated regularly and the latest listing should be consulted. The current Government Gazette notice is available on the DEC website.

DEC also maintains lists of fauna taxa that either need surveying to determine whether or not the species require special protection, or could require special protection if present circumstances change. These taxa are known as 'priority taxa'. Five categories are recognised, as follows:

Priority One – taxa with few, poorly known populations on threatened lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not managed for conservation, for example, agricultural or pastoral lands, urban areas, active mineral leases. These taxa need urgent survey and evaluation.

Priority Two – taxa with few, poorly known populations on conservation lands. Taxa which are known from few specimens or sight records from one or a few localities on lands not under immediate threat of habitat destruction or degradation, for example, national parks, conservation parks, nature reserves, state forest, vacant Crown land, water reserves. The taxa need urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority Three – taxa with several, poorly known populations, some on conservation lands. Taxa which are known from few specimens or sight records from several localities, some of which are on lands not under immediate threat of habitat destruction or degradation. These taxa need urgent survey and evaluation of conservation status before consideration can be given to declaration as threatened fauna.

Priority Four – taxa in need of monitoring. Taxa which are considered to have been adequately surveyed, or for which sufficient knowledge is available, and which are considered not currently threatened or in need of special protection, but could be if present circumstances change. These taxa are usually represented on conservation lands.

Priority Five – taxa that are conservation dependent. Species that are not threatened but are subject to a specific conservation program, the cessation of which would result in the species becoming threatened within five years.

DEC has regard for the systems for allocating taxa to threatened species categories used by IUCN that is, the World Conservation Union (previously the International Union for Conservation of Nature and Natural Resources) and the former Australian and New Zealand Environment and Conservation Council. In Western Australia, the Threatened Species Scientific Committee makes recommendations to the Minister for the Environment about the allocation of species to the IUCN categories. Information on the IUCN categories is on www.redlist.org/info/categories_criteria.

Surveys for threatened fauna

To identify whether threatened fauna species are likely to be impacted by a proposed development or land use in Western Australia, or whether species are likely to become threatened as a result of development, a staged investigation process is recommended.

This advice supplements that in EPA Guidance Statement No. 56 *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* (EPA 2004f).

Where disturbance of fauna habitat is proposed, it is recommended that a search of DEC's threatened fauna database is requested, and the Western Australian Museum's FaunaBase (www.museum.wa.gov.au) is checked, in conjunction with fieldwork and data analyses. It is expected that the field survey method will seek, and take into account any advice from DEC or other authorities with respect to potentially significant species on the site, and will be based on current best practice.

It is recommended that the survey work targets specially protected and priority fauna species, and any other species that may become threatened either locally or regionally as a result of development (also see Table 3 in Guidance Statement No. 56 (EPA 2004f)).

Important considerations include the level of significance of any habitat for threatened species, predicted impacts on threatened species over time, and the potential for cumulative impacts in an area that may put a species into a higher risk category.

It is noted that for many species and portions of the state, there have been few detailed fauna surveys. The absence of any records of specially protected or priority species from DEC's database, in some areas, does not imply that those species are not present. For this reason, it is important that proper field surveys are conducted. It is also recommended that the advice of DEC is sought when a survey methodology is being formulated.

In relation to development projects, a survey for threatened fauna will need to be part of more comprehensive biological survey work.

What to do if threatened fauna are likely to be present

If specially protected or priority fauna species or their habitats are identified, it is expected that DEC will be consulted, and that protection, possibly through setting aside land and/or a management plan, will be to the satisfaction of DEC, and in compliance with the *Wildlife Conservation Act 1950*.

Where adequate protection is not proposed, DEC may choose to refer the proposal to the EPA.

Proponents also have a responsibility to comply with the requirements of the *Environment Protection and Biodiversity Conservation Act 1999*. Triggers for the Commonwealth environmental assessment process include but are not limited to actions that may impact on nationally threatened species and ecological communities.

Attachment B3-3

The JAMBA and CAMBA agreements

To protect species of migratory birds in danger of extinction that migrate between Australia and Japan, and Australia and China, the governments of these countries agreed that co-operation was essential. Agreements were signed to commit the countries to take special measures to protect a list of identified species of birds, their eggs and their habitat.

The Agreement between the Government of Australia and the Government of Japan for the Protection of Migratory Birds in Danger of Extinction and Their Environment (JAMBA) was signed on 6 February 1974. The treaty was published as 'Australian Treaty Series 1981 No. 6' by the Australian Government Publishing Service, Canberra (Commonwealth of Australia 1995a). It can also be accessed via the Commonwealth Department of Environment and Heritage website www.deh.gov.au/biodiversity/migratory/index.

The Agreement between the Government of Australia and the Government of the People's Republic of China for the Protection of Migratory Birds and Their Environment (CAMBA) was signed on 20 October 1986. This treaty was published as 'Australian Treaty Series 1988 No. 22' by the Australian Government Publishing Service, Canberra (Commonwealth of Australia 1995b). It can also be accessed via the above website or the following website www.austlii.edu.au.

It should be noted that the names of some species are now different to those in the JAMBA/CAMBA agreements due to recent nomenclature changes.

Attachment B3-4

How much land is required to support native fauna?

A key issue for the protection of native fauna is 'How much native habitat is necessary to protect certain fauna species or species assemblages?' Unfortunately, in the light of present knowledge, this is a difficult question to answer. Sometimes small populations will persist for a long time in constrained areas and suddenly die out, for example, as a result of fire, drought or an imbalance of males to females. Australia has many species that are long lived, but may produce few progeny at long intervals. To ensure the survival of species and species assemblages, generally large areas need to be retained.

It is now generally accepted that small areas of habitat support fewer species than large areas of habitat. Possingham & Field (2001) have argued that reducing habitat to 10% of its original extent will eventually cause about 50% of the bird species dependent on that natural habitat to disappear.

From a biodiversity protection perspective, a key objective now being adopted in Australia is the protection of 30% of the original extent of ecological communities. When the extent of ecological communities falls below that figure, an exponential drop in the number of species has been noted (EPA 2000a).

However, studies in some parts of Australia indicate that a higher level of habitat protection is necessary to protect some species and ecological communities, and to maintain some of the ecological functions that ecosystems provide. In addition, the ability to retain species and communities will depend on other factors, such as the degree of fragmentation of bushland, the degree to which contiguous sequences of vegetation are retained, and the management regime. It is only when high proportions of the original habitat are retained that the degree of fragmentation and contiguity are less likely to be significant. For example, a study in Queensland found that when 70% of the native vegetation is retained, it does not matter how it is arranged across the landscape. Plants and some animals can move through, even those with restricted mobility. When less than 70% of vegetation is retained, problems arise for some species (ABC 2001).

It is generally recognised that very large areas are needed to ensure the long-term survival of a wide range of species. Thousands even tens of thousands of hectares may be a basic requirement (ABC 2001).

Nonetheless, small areas and altered areas do have some value as habitat fauna for some species. Although local studies of small remnants in the Perth metropolitan area show that larger areas of bushland have more species than smaller areas, it has also been found that remnants as small as 4 ha can maintain a high number of reptile species (How & Dell 2000).

The size of remnants required to support native mammals in Western Australia is indicated in Hussey & Mawson (2004).

With respect to the question of whether native habitat can be replaced by revegetated areas, from a biodiversity point of view, protecting lands from being cleared is more important. It can take five to ten decades to get soils, preferred breeding and shelter sites, the vegetation and the wildlife back to sustainable levels (ABC 2001).

Attachment B3-5

Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002

Context

The Western Swamp Tortoise is considered the world's most endangered tortoise or turtle species. There is wide concern in the community that the animal will become extinct in the absence of immediate and effective action to increase the size of the population and to protect its habitat. The Western Swamp Tortoise is recognised as an endangered species under the *Wildlife Conservation Act 1950*, the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* and the United Nations Convention on International Trade in Endangered Species of Wild Fauna and Flora.

Environmental protection policy for the Western Swamp Tortoise

The Environmental Protection Authority (EPA) has released an environmental protection policy (EPP) for the protection of the only known remaining habitat for the tortoise at Twin Swamps Nature Reserve and Ellen Brook Nature Reserve, approximately 30 km north of Perth.

The *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002* is a statutory policy which sets out the environmental objectives to be achieved and maintained to preserve and protect habitat suitable for the long-term survival of wild populations of the tortoise.

The EPP applies to a specified area that contains the surface and groundwater catchments around the Twin Swamps Nature Reserve and Ellen Brook Nature Reserve, to the best knowledge available.

The EPP applies to landowners, public authorities, the EPA and government services. It recognises a range of mechanisms and actions that are relevant to the protection of the tortoise, including the DEC's Western Swamp Tortoise Recovery Plan, catchment management planning, the land use planning and development process, the environmental impact assessment process and other legislative processes.

As the habitat is likely to come under pressure from development, the EPP in particular is designed to guide decision-making during the land use planning and development process.

At the time of publication of this guidance statement, draft EPA guidelines for the protection of Western Swamp Tortoise habitat are in preparation to complement the EPP.

The EPP seeks the appropriate management of the entire ecosystem which contains the Western Swamp Tortoise, including minimising or avoiding impacts from activities in the ground and surface water catchments of the two nature reserves that might degrade the tortoise's habitat. These activities may include, but are not limited to:

- the application of fertilisers and pesticides
- the disposal of liquid and solid wastes
- the discharge of polluting substances
- the extraction of basic raw materials
- the construction of drainage systems
- the placement of fill
- groundwater abstraction
- vegetation clearance
- unauthorised fires.

Chapter B4

Wetlands

B4.1 SIGNIFICANCE OF WETLANDS

Wetlands are an intrinsic part of the hydrology of a region. They are widely recognised as significant for their ecological, hydrological, social and economic values. Wetlands have characteristic vegetation, faunal assemblages and geomorphology, and typically support a high level of biological productivity and diversity. Wetlands can act as biological filters by retaining sediment, and absorbing nutrients and pollutants (Hill et al. 1996a). They also provide flood control by storing and detaining storm water.

The continued degradation and loss of wetland habitat in Western Australia, particularly on the Swan Coastal Plain, is an important issue. In 1994, it was estimated that over 80% of the original wetlands on the Swan Coastal Plain had been lost or seriously degraded (Balla 1994).

The complex interaction of hydrology, soil, climate, topography, flora and fauna gives rise to the differing attributes, functions and values of wetland areas. Typical values and functions that are relevant to the level of wetland protection are outlined in Attachment B4-1. Basic wetland types of the Swan Coastal Plain are outlined in Attachment B4-2.

This chapter focuses on permanently and seasonally inundated wetlands, and seasonally waterlogged wetlands. Estuaries and waterways are the focus of Chapter B5. The protection of karstic environments, which may contain subterranean wetlands, is addressed in Chapter B9.

TERMS

Wetland means 'an area of seasonally, intermittently or permanently waterlogged or inundated land, whether natural or otherwise, and includes a lake, swamp, marsh, spring, dampland, tidal flat or estuary' (Environmental Protection Act 1986) (EP Act).

The **wetland buffer** is the designated area adjoining a wetland that is managed to protect the wetland's ecosystem health.

The **wetland management category** is assigned to a wetland based on the evaluation of its attributes, functions and values. It provides guidance on the nature of management and protection the wetland should be afforded. The categories applied to the Swan Coastal Plain in Western Australia are **conservation, resource enhancement and multiple use**.

B4.2 EPA'S BROAD PRINCIPLES FOR THE PROTECTION OF WETLANDS

EPA's objectives

The EPA's Position Statement No. 4 on the environmental protection of wetlands (EPA 2004b) sets out the EPA's overarching goals for wetlands, as follows:

- *to protect the environmental values and functions of wetlands in Western Australia*
- *to protect, sustain and, where possible, restore the biological diversity of wetland habitats in Western Australia*
- *to protect the environmental quality of the wetland ecosystems of Western Australia through sound management in accordance with the concept of 'wise use', as described in the Ramsar Convention, and ecologically sustainable development principles, regardless of land use or activity*
- *to have as an aspirational goal, no net loss of wetland values and functions.*

The EPA's position on wetlands has its basis in the principles of ecologically sustainable development, wise use of natural resources, a holistic ecosystem management approach, inter-generational equity and the precautionary principle (EPA 2004b).

Further advice on the EPA's position follows:

Avoid impacts on wetlands

The EPA's position is that it is preferable to avoid direct, indirect and cumulative impacts that may adversely affect the attributes and functions of wetland areas. In all cases where some loss of any wetland value or function is unavoidable, the EPA recommends that compensatory actions are implemented, with a view to achieving 'no net loss of wetland values'.

Adequate information and consultation

The management of a wetland should derive from an adequate evaluation of the wetland's attributes and functions, and threatening processes. Decisions on the significance of a wetland and its appropriate environmental objectives and management measures should be based on a thorough set of information and appropriate consultation with the community, stakeholders, key government agencies (see Table B1) and environmental professionals with recognised expertise in wetland issues.

Protection based on the wetland management category

The EPA supports the identification of the wetland management category (see Attachment B4-2) as a useful tool in managing land use and development around a wetland. The EPA considers wetlands in terms of the three broad wetland management categories: Conservation, Resource Enhancement and Multiple Use. For the Swan Coastal Plain, the EPA has adopted the Department of Environment and Conservation (DEC) Geomorphic Wetlands Swan Coastal Plain dataset as the basis for environmental impact assessment. Any proposed modifications to the dataset should in the first instance be addressed to the DEC in accordance with current protocols provided on the DEC website.

Conservation category wetlands

The EPA urges that all Conservation category wetlands and appropriate buffers are fully protected. Schemes and proposals that are likely to lead to a significant adverse impact on these wetlands are likely to be formally assessed by the EPA.

Resource enhancement wetlands

The EPA urges that all reasonable measures are taken to minimise the potential impacts on Resource Enhancement wetlands and appropriate buffers. These wetlands have the potential to be restored to Conservation category, and rehabilitation is encouraged.

Multiple use wetlands

In the case of Multiple Use wetlands, the EPA urges that all reasonable measures are taken to retain the wetland's hydrological functions (including on-site water infiltration and flood detention) and, where possible, other wetland functions.

Integrated management approach

The EPA supports an holistic approach to the management of activities in the wetland catchment that integrates land use planning, catchment management, total water management, natural resource management and biodiversity protection.

Management of activities in the catchment

To protect the key attributes and functions of wetlands, the EPA expects appropriate management of all activities in their groundwater and surface water catchments. This includes activities that may individually or cumulatively impact adversely on wetland values, particularly water management activities (for example, stormwater, waste water, irrigation, water abstraction) and the clearing of native vegetation. A high standard of management is expected in the catchments of wetlands of high conservation significance (see B4.2.2), and the catchments of wetlands with a propensity for water quality problems, (for example, **eutrophication**).

Management near protected wetlands

To protect a wetland's values, key management actions should include the following:

- fully protect the wetland and buffer area (see Attachment B4-3 and section B4.3.2)
- rehabilitate disturbed areas and manage threatening processes
- implement setback requirements between the wetland and land uses with a potential to adversely impact the wetland
- implement setback between wetlands and land uses where disease-vector and nuisance insects may be a public health and amenity problem
- manage activities and developments outside the buffer area to avoid adverse impacts on wetland values. Current best practice measures should be identified and implemented for water management and construction management. The EPA's concept of best practice is described in EPA (2003c).

Mitigation of impacts

In all cases where projects may cause unavoidable loss of wetland attributes or function, the EPA recommends that compensatory actions are implemented. The preferred order of preference as set out in Position Statement No. 9 *Environmental Offsets* (EPA 2006a) is:

- avoidance of adverse impacts
- minimisation of adverse impacts
- rectification through repair and restoration of impacted sites as soon as possible
- reduction and elimination of adverse impacts over time
- offsets carried out to counterbalance adverse impacts (at a distance from the impacted site).

B4.2.1 EPA'S PUBLISHED POSITION

The following documents set out the EPA's published position on aspects of wetland protection.

Gazetted environmental protection policies

- *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* (Government of Western Australia 1992a)
- *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998* (Government of Western Australia 1998b)
- *Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002* (Government of Western Australia 2003c).

Position statements

- *Environmental Protection of Wetlands Position Statement No. 4* (EPA 2004b).
- *Position Statement No. 9 Environmental Offsets* (EPA 2006a)

Guidance statements

- *Rehabilitation of Terrestrial Ecosystems Final Guidance Statement No. 6* (EPA 2006c)
- *Level of assessment for proposals affecting natural areas within the System 6 region and Swan Coastal Plain portion of the System 1 Region Final Guidance Statement No. 10* (EPA 2006b)
- *Protection of Lake Clifton Catchment Final Guidance Statement No. 28* (EPA 1998a)
- *Groundwater Environmental Management Areas Draft Guidance Statement No. 48* (EPA 1998b and update)
- *Guidance Statement for Management of Mosquitoes by Land Developers Final Guidance Statement No. 40* (EPA 2000c)
- *Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia Guidance Statement No. 51* (EPA 2004)
- *Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia Guidance Statement No. 56* (EPA 2004d).
- *Environmental Offsets Draft Guidance Statement No. 19* (EPA 2007c)

Reports

- *Strategy for the Protection of Lakes and Wetlands of the Swan Coastal Plain* Bulletin 685 (EPA 1993b)
- *A Guide to Wetland Management in the Perth and Near Perth Swan Coastal Plain Area* Bulletin 686 (EPA 1993c)
- *A Policy Framework for the Establishment of Wetland Banking Instruments in Western Australia: Draft for Public Comment* (EPA 2001c).

Key government policies are in Table B1. Key DEC documents are listed in E3 and E4.2.

B4.2.2 WETLANDS OF HIGH CONSERVATION SIGNIFICANCE

For the purposes of the environmental impact assessment process, the EPA considers that the wetlands in the list below are of high conservation significance, and require a high level of protection. The EPA notes that comprehensive wetland surveys have not been carried out for all regions of the State. Thus in some regions site investigations will be required to determine whether there are wetlands of high conservation significance in or near an area of interest (see Attachment B4-2).

Wetlands of high conservation significance include:

- Conservation category wetlands as identified on DEC's *Geomorphic Wetlands Swan Coastal Plain* dataset, (see Attachment B4-2 on where to access the dataset)
- wetlands identified as 'Conservation category' following application of an EPA-endorsed methodology
- wetlands protected under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*. The policy area for these environmental protection policies is shown indicatively in Figure B3
- wetlands in Perth's Bush Forever sites (Government of Western Australia 2000b and updates), and Regional Open Space in the Greater Bunbury Region Scheme and the Peel Region Scheme
- wetlands in sites recommended for protection in the Systems 'Red Book' Reports (Department of Conservation and Environment 1976–1983) except where superseded by later conservation recommendations adopted by government
- wetlands nominated for protection in the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998* (Government of Western Australia 1998b). At the time of publication of this guidance statement, two wetlands were protected under this policy, Lake Monjigup in Esperance and Koojeda Swamp in Northam
- wetlands recognised by the Ramsar Convention on Wetlands of International Importance (see Attachment B4-4)
- wetlands supporting water birds listed in the Japan Australia Migratory Bird Agreement (JAMBA) and the China Australia Migratory Bird Agreement (CAMBA) (see Attachment B3-3)
- wetlands identified in *A Directory of Important Wetlands in Australia* (Environment Australia 2001b) or its latest update (see Attachment B4-4)
- wetlands in sites on the Register of the National Estate (see the Australian Heritage Council website www.ahc.gov.au)
- wetlands on land vested for National Park or Nature Reserve purposes, sites endorsed by government for inclusion in the conservation estate, and sites recommended for the conservation estate by government agencies responsible for biodiversity protection and conservation
- wetlands with **significant vegetation, significant flora** or habitat that supports **significant fauna** as accepted by the EPA, for example, threatened ecological communities, Declared Rare Flora, Specially Protected Fauna
- wetlands identified as having high conservation significance by an authority on wetlands, for example, DEC, or following a thorough process, subject to confirmation by the EPA.

On the Swan Coastal Plain, most of the wetlands of high conservation significance are mapped as conservation category wetlands on the *Geomorphic Wetlands Swan Coastal Plain* dataset maintained by the DEC. See Attachment B4-2 on where to access the dataset.

In areas where comprehensive wetland mapping has not been carried out and where development is proposed, the EPA expects that wetlands that may be directly or indirectly affected by a proposed development will be identified and values assessed to establish their significance and management category in consultation with the DEC and other relevant agencies. In the case of a scheme or proposal that is subject to the formal environmental impact assessment process, the methodology should also be checked with the EPA Service Unit to ensure it is appropriate for the particular assessment.

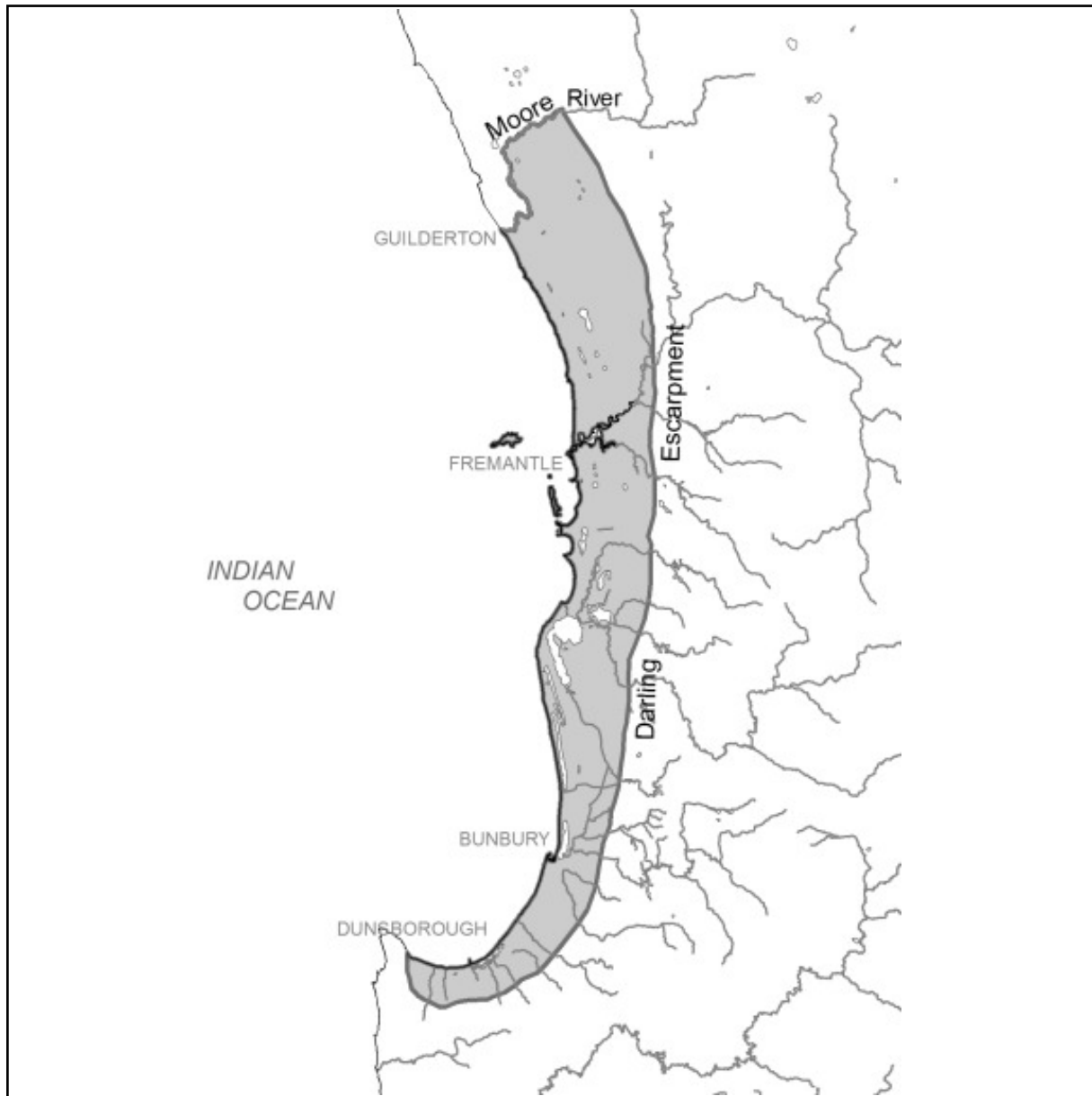


Figure B3. Policy area of the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992

B4.3 CONSIDERING WETLANDS DURING PLANNING

The EPA urges that land use planning and development processes, as far as practicable, contribute to ensuring healthy and sustainable wetlands.

The protection of wetlands is facilitated when wetland issues are recognised early in planning for a region or site, and provision is made for wetland protection at each level of planning.

B4.3.1 BROAD SCALE PLANNING

To assist in achieving an acceptable environmental outcome for wetlands, it is recommended that the following checklist be applied during the formulation of strategic plans, structure plans and new town planning schemes.

CHECKLIST FOR CONSIDERING WETLAND ISSUES DURING BROAD SCALE PLANNING

- ☐ Identify all the wetlands within and near the study area.
- ☐ Consider relevant environmental protection policies (see B4.2.1), statements of planning policy and other key government policies (Table B1).
- ☐ Have regard for any existing catchment studies, natural resource management plans and other public strategies and plans.
- ☐ Carry out consultation with stakeholders, the public and government agencies. DoW is generally included as the agency with primary responsibility for administering legislative requirements to protect and manage the State's water resources.
- ☐ Carry out desk top and field research to identify wetland attributes, functions and values. Identify potential threats from development and activities within and outside the study area. The level of investigations may depend on the scale of planning and likely pressures on the environment. Examples of values, impacts and issues are in Attachment B4-1.
- ☐ Identify the surface water and groundwater catchments of the wetlands within and near the study area (as the catchment of external wetlands may extend into the study area). This is particularly important in the case of conservation category wetlands and wetlands under stress where careful management of land uses in the catchment is needed.
- ☐ Identify the level of environmental significance and broad environmental objectives for the wetlands that may be impacted by activities in the study area. These considerations are typically represented by the wetland management category. For sites on the Swan Coastal Plain, refer to the Geomorphic Wetlands Swan Coastal Plain dataset to identify if a wetland has a current management category. Where information is not available or the dataset is in dispute, submit results of investigations and proposed management to the DoW for comment and advice at an appropriate time. Ensure that approved methodologies are used.
- ☐ Consider wetland issues in conjunction with total water management and biodiversity protection planning for the region. Integrate planning with these processes as far as practicable.
- ☐ When considering planning options for the study area, take into account the potential for adverse impacts (direct, indirect and cumulative) on wetlands given the specific site conditions. Avoid locating development where a high level of management is required to protect significant wetlands. For example, general industrial development is not an optimal land use over transmissive soils near significant wetlands.
- ☐ When deciding on land use categories and planning measures for the study area, ensure that wetland protection objectives and catchment water quality objectives can and will be met. This may necessitate baseline data collection and modelling of impacts early in the planning process. In the absence of sufficient technical information a precautionary approach should be taken.
- ☐ As appropriate, identify the approach that will be taken at subsequent stages of the planning process to achieve the objectives for wetlands. For example, establish when measures to protect wetlands and their buffers will be determined and implemented. Determine the information gaps and the appropriate timing of data collection, modelling of impacts, analyses and management measures. In areas where there are pressures on wetlands, it is recommended that buffers and key buffer management measures are identified at an early stage of planning.

B4.3.2 LOCAL AREA PLANNING

It is recommended that decision-making authorities and applicants apply the steps below when considering a proposed development, subdivision, detailed structure plan or scheme amendment where wetlands are in or near the development or planning area:

- Consider and implement items in the checklist in B4.3.1, depending on the extent to which wetland attributes and issues have been identified at the strategic and structure planning stages. Where there is a potential for adverse impacts on wetlands, ensure detailed information is obtained on the location of the wetlands, their attributes, functions and their management category.
- Establish:
 - whether the site of the proposed land use or development is appropriate, having regard for wetland management objectives
 - whether the site layout/design can be modified to reduce potential impacts on any wetland.
- Identify conditions that may be imposed through the planning process to complement those of other processes, to ensure that wetland management objectives are met.

Examples of potential measures for siting, design and management follow.

Management measures

The list of potential management measures (below) is relevant to siting and design, and the setting of conditions on development. The extent to which the measures are applicable to a specific proposed land use, subdivision, development or scheme amendment will depend on the particular circumstances (experience in a particular catchment may suggest additional items).

- **Boundary alignment** - Locate lot boundaries so that they do not intersect wetlands and their buffers. This is recommended as lot boundaries are typically cleared and kept free of native vegetation for fencing, access and firebreak purposes. Careful boundary alignment is especially important in the case of Conservation category wetlands.
- **Wetland buffers** - Determine, protect and manage a buffer between a wetland and existing or proposed land uses. This is crucial to maintain or improve wetland values. Refer to Attachment B4-3 for information on the determination of wetland buffers. Note that planning and other decision-making authorities may have specific additional requirements that should be met. The EPA may also specify particular studies should a proposal or scheme be subject to the formal environmental impact assessment process.

The following are encouraged:

- Retain all remnant vegetation in the buffer.
- No fill, no fertiliser or chemical application, no drainage into or out of (other than natural or approved stormwater management), no groundwater or wetland water abstraction, no liquid or solid waste disposal, and no excavation is permitted in the wetland or the buffer.
- Repair degraded/eroded portions of the buffer.
- Rehabilitate the **wetland vegetation** and the adjoining dryland zones using indigenous species of local provenance.
- Remove inappropriate infrastructure.
- Install fencing, paths and gates to control access.
- Replace inappropriate drainage facilities.
- **Ecological linkages** - Protect ecological linkages between the wetland buffer and neighbouring vegetation or open space. Native vegetation linkages are particularly valuable (Chapter B2). Linkages should be considered at the same time as buffer requirements.
- **Wetland reserve** - Consider setting aside a public reserve (that is, a reserve as shown on a plan of survey) or widening an existing reserve. It is preferred that the buffer of a Conservation category or Resource Enhancement wetland in an urban or closely settled area is set aside as a reserve.

- **Restrictive covenants and other controls to exclude inappropriate use and development from the wetland buffer** - (may be applicable in a rural or semi-rural area where public ownership of the wetland is not warranted.) Ensure all inappropriate development in the wetland and its buffer can be excluded through, for example, scheme provisions, conditions of planning approval and restrictive covenants.
- **Wetland management plan** - Prepare and implement a wetland management plan for the wetland and its buffer. Key components that should be in all environmental management plans are listed in Attachment A1-2. Suggested components for a wetland management plan are in Attachment B4-5.
- **Manage construction impacts** - Clearing and construction activities for approved development near wetlands should be timed and managed to minimise the risk of environmental harm. Fencing to define the construction area is usually appropriate. Construction must be managed to prevent erosion and sediment transport. At the completion of works, carry out site stabilisation and rehabilitation with native species of local provenance.
- **Protect wetland from livestock** - Measures include fencing, controlled watering points and stock density control.
- **'Hard edges' to wetland buffer (for example, roads and pathways** - Where wetlands and their buffers are open to the public, a surrounding road (with lots fronting the open space) is desirable to provide a physical boundary to delineate the wetland and its buffer, enable surveillance and deter vandalism and other inappropriate activities. A hard edge is a useful management tool to control the spread of weeds and grass between grassed areas and areas of native vegetation.
- **Setbacks for land uses with a relatively high potential for site contamination or nutrient export** - The setback should take into account the potential of the development to adversely impact on the wetland, the proposed management of environmental impacts, and the extent to which enforceable conditions on development will be imposed by decision-making authorities. Land uses associated with a relatively high potential for site contamination or nutrient export (for example, some forms of intensive agriculture, industry and some effluent treatment facilities) may need to be located farther from the wetland than the determined wetland buffer. Advice may be obtained from industry experts and the relevant government agencies.
- **Integrate with regional or local area water management plan/strategy** - The management of development should be consistent with any comprehensive, up-to-date, accredited regional or local area water management plan/strategy. Water management strategies are particularly valuable prerequisites in wetland catchments with a propensity for water quality problems, and where development has the potential to adversely affect the water regime of significant wetlands.
- **Environmental management plan for development adjoining (outside) a wetland buffer** - For a development site near a wetland, prepare and implement a management plan addressing stormwater, waste, air quality, sediment, nutrient management and other issues to incorporate best practice and water sensitive urban design principles and monitoring requirements. This should be prepared at the same time, or as part of, a wetland management plan. The management plan should include contingency provisions in the event that the criteria established for water quality and quantity are not met. General environmental management plan requirements are outlined in Attachment A1-2. The environmental management plan may also include measures to manage potential edge effects, for example, fencing and gates, weed management, irrigation management. Prepare plans for approval prior to commencement of development.
- **Acid sulfate soil management** - In areas of risk, carry out acid sulfate soil assessments prior to disturbing soil or altering groundwater levels, and manage as appropriate in accordance with Western Australian Planning Commission (WAPC) guidelines (WAPC 2003b) and DEC guidelines (listed in E3.10). The disturbance of acid sulfate soils should be avoided.
- **Surface and Groundwater abstraction** - Ensure that abstraction does not alter the wetland's natural hydrological regime. Information on abstraction management and approval should be obtained from the Department of Water. Any proposal that appears likely, if implemented, to have a significant effect should be referred to the EPA

- **Flooding** - Consider the role of flooding in maintaining a wetland's values (especially in the case of a Conservation category wetland). Where flooding is required, locate and manage the development accordingly.

Also see advice provided on waterways (Chapter B5), land degradation issues (Chapter B7) and water management (Chapter C3).

B4.4 REFERRAL TO THE EPA

This section should be read in conjunction with the general requirements for the referral of schemes and proposals to the EPA in A3.2.1 and A4.2.1.

B4.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

Any proposal that is likely to have an impact on a Conservation category wetland is a 'significant proposal' under section 38 of the EP Act. The EPA requires that decision-making authorities and proponents refer to the EPA any development proposal or subdivision likely to significantly impact the environmental values of a Conservation category wetland. Examples of significant impacts include: clearing of native vegetation, mining, filling excavating, draining disposal of waste, allowing emissions into the wetland, and activities located near the wetland without the provision of an appropriate setback or buffer, such as clearing or groundwater abstraction.

Certain impacts to wetlands identified for protection pursuant to the *Environmental Protection (Swan Coastal Lakes) Policy 1992* and the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998* are not permitted unless authorised. Typically, authorisation involves referral of the proposal to the EPA pursuant to s38 EP Act.

B4.4.2 INFORMATION TO ACCOMPANY A REFERRAL

Information that assists the EPA to set the level of assessment on a referral will vary depending on the location and nature of the scheme or proposal. Where a significant wetland (B4.2.2) is within or near land the subject of a scheme or proposal, the following referral information is helpful.

- conservation status/management category of the wetland/s (based on DEC data where available, or alternatively the methodologies referred to in Attachment B4-2)
- aerial photography, with the proposal or scheme area and key components of development and land use superimposed
- advice on the extent of any site-specific investigations that have been carried out
- information on values and issues, for example, presence of threatened ecological communities, rare flora or threatened fauna; acid sulfate soils
- identification of likely impacts on the wetland/s and buffer areas (for example, clearing of vegetation, draining, filling, construction works)
- description of the proposed management and mitigation measures, having regard for the EPA's Position Statement No. 9 *Environmental Offsets* (EPA 2006a)
- list of any other approvals that may be required
- the results of any consultation carried out, including the comments of agencies with environmental responsibilities, for example, DEC.

In some instances the EPA may request additional information. Where further information is required and where possible, please provide all relevant data in digital and GIS format.

Attachment B4-1

Wetlands: functions, values, impacts and the role of vegetation

To assist consideration of the issue of wetland protection, this attachment briefly discusses:

- wetland functions
- significant wetland values
- activities that adversely impact on wetlands (threats)
- the role of native vegetation in and around wetlands.

ATTRIBUTES

Wetland attributes are a characteristic or combination of characteristics which is valued by a group in society, but which does not necessarily support a use, including:

- biodiversity
- landscape and aesthetic qualities
- scientific information (e.g. demonstrates evolutionary processes)
- habitat
- cultural significance.

FUNCTIONS

Wetland functions are the physical, biological and chemical processes occurring within a wetland, including:

- nutrient cycling
- maintaining the local and regional ground and surface water regime (hydrological balance), through regulating water quality and quantity
- removing nutrients, pollutants, sediment and some pathogens (wetland plants and sediments have this ability, though finite)
- storing rain and flood waters
- mitigating climate change by absorbing carbon.

In many cases, wetlands function hydrologically and ecologically as part of an interrelated network of wetlands.

VALUES

The Environmental Protection Authority (EPA) uses the term **environmental values** to encompass particular uses or values of the environment that are important for a healthy ecosystem, or for public benefit, safety or health, and which require protection from the effects of pollution and harm. The environmental values of a wetland depend on its attributes and encompass the above functions. Specific wetland values include, but are not limited to:

Ecosystem values

- high biological diversity compared to other ecosystems
- high biological productivity compared to other ecosystems
- habitat for rare or threatened communities or species, or species of restricted or unusual distribution
- habitat for international migratory bird species listed in the JAMBA and CAMBA agreements
- indicator of catchment health.

Human use values

- recreation
- Aboriginal and historical heritage
- landscape amenity
- cultural and spiritual value for indigenous and non-indigenous people (a wetland may foster a sense of place or other positive personal experience)
- social opportunities, for example, a meeting place or site for a family picnic
- economic uses, including tourism
- provision of items of interest to some of the community, for example, bark and reeds for handcrafts
- aesthetic interest and variety in the landscape
- a study site for educational purposes
- a site for scientific studies, for example, of pollen records, sediments, geomorphology or hydrology
- evidence of evolutionary and archaeological past.

Human use values often conflict with maintaining the ecological values of wetlands. This needs consideration when planning activities in and around wetlands.

Area that support wetland values

The area that supports the values associated with a wetland will clearly depend on its particular values. Generally, the area of most value comprises areas of open water, areas of seasonally or intermittently saturated soil, areas of wetland vegetation, and a surrounding dryland area that may include cleared land as well as native dryland vegetation. Methodologies for determining the area to be protected around wetlands are in Attachment B4-3.

IMPACTS

The integrity of a wetland is typically influenced by the activities adjacent to a wetland and those in the wider catchment, which will individually or cumulatively affect the wetland's condition.

The following checklist presents activities and land uses that have the potential to adversely impact on the ecological, hydrological and some human use values of wetlands, if carried out in or near a wetland.

- clearing of vegetation
- excavation, dredging or mining
- draining water into or out of a wetland
- filling with soil or other material
- direct discharge or disposal of stormwater and/or effluent into the wetland or its buffer
- use, storage or disposal of nutrients or chemicals
- waste disposal or processing
- abstraction of surface or groundwater
- dewatering
- frequent fires
- firewood collection
- grazing by stock
- release of pollutants
- use of fertilisers, sprays (for example, sprays for midge and mosquito control) and watering (irrigation)
- recreational activities, which may contribute to compaction of ground, damage to vegetation, introduction of weeds, rubbish
- vehicular activities
- disturbance of acid sulfate soils (see Chapter B7)
- any other works or development in the wetland or its buffer.

Activities and land uses in the groundwater or surface water catchment of a wetland that may indirectly affect a wetland include the following:

- most urban and agricultural activities, through the export of nutrients and other contaminants
- drainage systems
- effluent disposal systems
- ground disturbing activities, for example, agriculture and urban construction works, that contribute to land and water degradation processes such as erosion and sedimentation
- industrial and commercial activities and infrastructure that may release solid or liquid contaminants or discharges to the ground
- groundwater abstraction in the catchment of wetlands fed by groundwater
- disturbance of acid sulfate soils
- the clearing of vegetation, leading to salinisation and other threatening processes.

Weeds, pests, diseases and climate change also can threaten wetland values. Effective protection of a wetland requires that land use activities in the surrounding surface water and groundwater catchments are appropriately managed. Many Western Australian wetlands are fed by groundwater. In this case, they may have a large groundwater catchment but small surface water catchment. The relationship between groundwater and wetlands can be complex, but should be considered, to ensure appropriate management measures are identified and adopted to protect wetland values.

Inappropriate development and activities on or near wetlands will result in the loss of values and increased costs to the community. The community and government are expending time, effort and resources to replace wetland hydrological functions, rectify wetland water quality and rehabilitate wetlands.

THE ROLE OF VEGETATION IN AND AROUND WETLANDS

Both the wetland vegetation and the surrounding dryland vegetation are important in maintaining the values of wetlands. Native vegetation in and around wetlands has the following functions:

- maintains ecosystem stability
- provides fauna habitat
- provides corridors for fauna movement, connecting wetland and dryland habitats
- reduces water runoff from surrounding land
- reduces the amount of sediments, contaminants and nutrients in runoff
- provides shade that modifies water temperatures
- provides material for wetland food chains
- provides material which breaks down to provide tannin—a key ecosystem component in coloured wetlands
- may assist in minimising weed invasion
- reduces the spread of midges
- reduces disturbance of fauna by human activities
- obscures incompatible scenery from the wetland
- controls stream salinity
- stabilises banks
- protects wetlands from adverse impacts.

Attachment B4-2

Classification and evaluation of wetlands

WETLAND CLASSIFICATION

The DEC has adopted the Semeniuk (1995) geomorphic classification system, which classifies wetlands on the basis of landform and water permanence (See Table B2)

Table B2. Basic wetland types formed from combining landform and hydroperiod attributes (Semeniuk & Semeniuk, 1995)

Water longevity	Landform				
	Basin	Channel	Flat	Slope	Highland
Permanent inundation	Lake	River	-	-	-
Seasonal inundation	Sumpland	Creek	Floodplain	-	-
Intermittent inundation	Playa	Wadi	Barlkarra	-	-
Seasonal waterlogging	Dampland	Trough	Palusplain	Paluslope	Palusmont

WETLAND EVALUATION

On the Swan Coastal Plain

Wetland evaluation is the process of assessing and documenting a wetland's values by considering information about its attributes and functions. The Swan Coastal Plain wetlands have been evaluated and assigned an appropriate management category, providing guidance on the nature of the management and protection the wetland should be afforded.

A number of methodologies have been used on the Swan Coastal Plain to assign wetland management categories, as described below. At the time of publication of this guidance statement, an updated methodology is being developed by the DEC and when endorsed will replace the methodologies below

Wetlands of the Swan Coastal Plain Volume 2A Wetland Mapping, Classification and Evaluation (Hill et al. 1996)

Hill et al. (1996a) outlines a two-tiered approach to evaluate wetlands and assign management categories. The first tier uses known rigorous evaluations to identify outstanding wetlands that should be given the highest level of protection. In the second tier, rapid evaluations are carried out to determine management objectives and may identify outstanding wetlands that were not included in the first evaluation due to a lack of information.

First-tier evaluation

Recognition mechanisms used in the first-tier evaluation of Perth-Bunbury wetlands include:

- Ramsar Convention on Wetlands of International Importance (see Attachment B4-4)
- *A Directory of Important Wetlands in Australia* (see Attachment B4-4)
- Register of the National Estate (see Attachment B4-4)
- Conservation Through Reserves System 6 report (Department of Conservation and Environment 1983)
- The Perth-Bunbury Study (LeProvost et al. 1987)

Second-tier evaluation

Two methods of wetland evaluation have been used in the second-tier, including:

- Environmental Protection Authority bulletins
- assessment of wetland vegetation status

EPA Bulletin evaluation method

A methodology to determine wetland management categories is described in EPA Bulletin 686 A Guide to Wetland Management in the Perth and Near Perth Swan Coastal Plain Area (EPA 1993c) and it's precursor EPA Bulletin 374.

Bulletin 686 is a preliminary broad-brush methodology to assist in the determination of management categories. It involves a questionnaire and scoring method, which provides an indication of the appropriate management category. It is important to note that the Bulletin 686 methodology is not well-equipped to recognise wetland condition, floristic complexities and less conspicuous fauna present in sumplands, damplands and palusplains. Further, it has proved more practicable to reduce the five management categories in Bulletin 686 to the three management categories used today (Table B3). Bulletin 686 is currently being revised, and until the new methodology is released, the Bulletin 686 methodology should be used as a guideline for the type of information that will assist in determining wetland values. The additional criteria and evaluation methods detailed in Chapter 5 of Hill et al. (1996) and V & C Semeniuk Research Group (1998) should also be considered.

Wetland vegetation assessment

Remnant vegetation on all extensive wetlands over 70ha (i.e. generally palusplains and damplands) has been mapped and described as complete vegetation cover, partial disturbance of either canopy or understorey, or tree cover with removal of understorey. In consideration of the widespread clearing that has occurred on Swan Coastal Plain wetlands, all vegetated sections of extensive wetlands have been assigned as Conservation category.

For all other wetlands under 70ha (e.g. generally lakes, sumplands and damplands) an assessment has been made of the naturalness (i.e. percentage of vegetation undisturbed) of the wetland. Wetlands 95-100% undisturbed have been assigned as Conservation category, wetlands 10-94% undisturbed have been assigned as Resource Enhancement and wetlands 0-9% undisturbed have been assigned as Multiple Use.

Representativeness

Using the information collected in first- and second-tier evaluation a preliminary ranking of value and condition of wetlands within consanguineous suites has been undertaken. A consanguineous suite contains wetlands that are related to each other because they have similar geomorphic, stratigraphic and hydrologic features, and similar processes of formation and maintenance. Consanguineous suites provide a framework for identifying basic regional representativeness and basic wetland diversity. By using the ranking of wetlands within a consanguineous suite, wetlands of high value in need of protection and reservation have been identified.

Evaluation of wetlands on the southern Swan Coastal Plain (V & C Semeniuk Research Group, 1998)

V & C Semeniuk Research Group (1998) outlines a set of criteria to evaluate wetlands between Mandurah and Dunsborough, and have assigned management categories with respect to natural or ecological attributes. The criteria have been designed to assess the following wetland attributes:

- wetland type
- wetland processes maintaining the system
- wetland habitats
- wetland functions
- biodiversity
- scientific value.

Outside the Swan Coastal Plain

Preliminary wetland evaluation, to varying degrees, has been undertaken in some regions of Western Australia (see the studies listed below in 'Identifying the presence of a wetland— Outside the Swan Coastal Plain'). In addition, the Wetlands Coordinating Committee is currently preparing a statewide framework for the mapping, classification and evaluation of wetlands in Western Australia.

Table B3. Wetland management categories

Management category	General description	Management objectives
Conservation (incorporates EPA Bulletin 686 categories H and C)	Wetlands which support a high level of attributes and functions	<p>Highest priority wetlands. Objective is to preserve and protect the existing conservation values of the wetlands through various mechanisms including:</p> <ul style="list-style-type: none"> • reservation in national parks, crown reserves and State owned land, • protection under Environmental Protection Policies, and • wetland covenanting by landowners. <p>No development or clearing is considered appropriate. These are the most valuable wetlands and any activity that may lead to further loss or degradation is inappropriate.</p>
Resource enhancement (incorporates EPA Bulletin 686 categories O and R)	Wetlands which may have been partially modified but still support substantial ecological attributes and functions	<p>Priority wetlands. Ultimate objective is to manage, restore and protect towards improving their conservation value. These wetlands have the potential to be restored to Conservation category. This can be achieved by restoring wetland function, structure and biodiversity.</p> <p>Protection is recommended through a number of mechanisms.</p>
Multiple use (aligns with EPA Bulletin 686 category M)	Wetlands with few remaining important attributes and functions	Use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning through landcare.

Source: adapted from Wetlands of the Swan Coastal Plain Volume 2A Wetland Mapping, Classification and Evaluation (Hill et al. 1996 Water and Rivers Commission Wetland Position Statement (WRC 2001b)

Attachment B4-3

Determining the location of wetlands, wetland boundaries and buffers

This section outlines the processes that help identify:

- whether a wetland may be present
- the boundary of a wetland
- the wetland buffer.

The classification and evaluation of wetlands are separate considerations and are discussed in Attachment B4-2.

IDENTIFYING THE PRESENCE OF A WETLAND

On the Swan Coastal Plain

Detailed wetland mapping has been undertaken on the Swan Coastal Plain (Wedge Island to Dunsborough). The list below identifies some key resources:

- the *Geomorphic Wetlands Swan Coastal Plain* dataset is maintained by the DEC and is available through the Geographic Data Atlas, Department of Environment and Conservation site: www.dec.wa.gov.au Tools, systems and data (cadastre available). It may also be supplied by the DEC, from the Geographical Information Systems Support Analyst Officer (a fee may apply for businesses). The dataset contains the information from:
 - Hill, A.L., Semeniuk, C. A., Semeniuk, V. & Del Marco, A. 1996a and b *Wetlands of the Swan Coastal Plain Volumes 2a and 2b Wetland Mapping, Classification and Evaluation* Department of Environmental Protection (DEP) and Water and Rivers Commission (WRC), Perth
 - Semeniuk, V & C Research Group 1998a 'Evaluation of Wetlands on the Southern Swan Coastal Plain' unpublished report prepared for WRC, Perth• wetlands nominated for protection under the Ramsar Convention (see Attachment B4-4)
- wetlands identified in *A Directory of Important Wetlands in Australia* (see Australian Wetlands Database www.deh.gov.au > Inland waters > Wetlands > Databases and information)
- wetlands nominated for protection under the Ramsar Convention (see Attachment B4-4)
- the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* identifies lakes on the coastal plain south of Moore River
- Hill, A.L., Semeniuk, C. A., Semeniuk, V. & Del Marco, A. 1996a and b *Wetlands of the Swan Coastal Plain Volumes 2a and 2b Wetland Mapping, Classification and Evaluation* Department of Environmental Protection (DEP) and Water and Rivers Commission (WRC), Perth
- LeProvost, Semeniuk & Chalmer 1987 *Environmental Significance of Wetlands in the Perth to Bunbury Region Volumes 1 and 2*, Western Australian Water Resources Council, Perth
- Semeniuk, V & C Research Group 1998a 'Evaluation of Wetlands on the Southern Swan Coastal Plain' unpublished report prepared for WRC, Perth• wetlands nominated for protection under the Ramsar Convention (see Attachment B4-4)

Additional information can be obtained from:

- *WetlandBase - The Western Australian Wetlands Database* is maintained by DEC and is available from www.naturebase.net
- topographical and environmental geology maps, aerial and stereoscopic photography, and natural resource or catchment information.

Most of the wetlands of the Swan Coastal Plain have been identified, however not all of the mapped information has been verified. Field surveys may be necessary in some areas to identify wetlands, on the advice of relevant government departments and natural resource experts.

Outside the Swan Coastal Plain

Resources showing mapped wetlands outside the Swan Coastal Plain include:

- wetlands nominated for protection under the Ramsar Convention (see Attachment B4-4)
- wetlands identified in *A Directory of Important Wetlands in Australia* (Environment Australia 2001b) or its latest update (see Australian Wetlands Database on the Department of Environment and Heritage website www.deh.gov.au/water/wetlands/database/index.html)
- wetlands nominated for protection under the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1998* (Government of Western Australia 1998b). At the time of publication of this guidance statement, two wetlands were protected: Lake Monjingup in Esperance and Koojeddah Swamp in Northam
- WetlandBase - The Western Australian Wetlands Database is maintained by the DEC and is available from www.naturebase.net
- *Geomorphic Wetlands Augusta to Walpole* dataset is maintained by the DEC and is available from Geographic Data Atlas, www.dec.wa.gov.au Tools, systems and data (cadastre available)
- *South Coast Significant Wetlands* dataset is maintained by the DEC and is available from Geographic Data Atlas, Department of Environment and Conservation site: www.dec.wa.gov.au Tools, systems and data (cadastre available)
- ecologia 2000 'A Preliminary Evaluation of Wetlands in the Esperance Water Resource Region' unpublished report prepared for WRC, Perth
- Pen, L. 1997 *A Systematic Overview of Environmental Values of the Wetlands, Rivers and Estuaries of the Busselton–Walpole Region* Water and Rivers Commission, Perth
- Semeniuk, V & C Research Group 1994 'Ecological Assessment and Evaluation of Wetlands in the System 5 Region' unpublished report prepared for the Australian Heritage Commission, Canberra, Australian Capital Territory
- Semeniuk, V & C Research Group 1996 'Classification and Evaluation of Natural Wetland Regions of the Southern Coastal Plain between the Blackwood and Nornalup/Walpole Estuaries, Southwest Western Australia' unpublished report prepared for the Australian Heritage Commission, Canberra, Australian Capital Territory
- Semeniuk, V & C Research Group 1998b 'Preliminary Delineation of Consanguineous Wetland Suites between Walpole and Fitzgerald Inlet, Southern Western Australia' unpublished report prepared for WRC, Perth
- Semeniuk, V & C Research Group 1999 'Preliminary Delineation of Consanguineous Wetland Suites in the Pallinup–North Stirling Region, South Western Australia' unpublished report prepared for WRC, Albany, Western Australia
- Semeniuk, V & C Research Group 2000a 'Wetlands of the Northwestern Great Sandy Desert in the LaGrange Hydrological Sub-basin' unpublished report prepared for WRC, Perth
- Semeniuk, V & C Research Group 2000b 'Wetlands of the Pilbara Region: Description, Consanguineous Suites, Significance' unpublished report prepared for WRC, Perth
- Water and Rivers Commission 1997 *Mapping and Classification of Wetlands from Augusta to Walpole in the South West of Western Australia* Water Resource Technical Series No. 12, Water and Rivers Commission, Perth
- topographical and environmental geology maps, aerial and stereoscopic photography, and natural resource or catchment information.

Much of the state remains to be surveyed for wetlands, and in those areas already surveyed not all of the mapped information has been verified. Therefore, field surveys may be necessary to identify wetlands, on advice of relevant government departments and natural resource experts. In some regions unpublished wetland mapping is available from the DEC and could provide preliminary information.

IDENTIFYING WETLAND BOUNDARIES

Identification and delineation of a wetland is reliant upon characteristics of hydrology, **hydric soils** and wetland vegetation (Hill et al. 1996). Wetland vegetation reflects hydrology and hydric soils and in particular obligate wetland species (i.e. those plants generally restricted to wetland habitats) are considered reliable wetland indicators (Tiner 1999). However, when wetland vegetation has been altered or removed and the hydrology is difficult to determine hydric soils may be the only reliable wetland indicator remaining. Information on the hydric soils of the Swan Coastal Plain is detailed in Semeniuk & Semeniuk (2004).

The DEC *Geomorphic Wetlands Swan Coastal Plain* dataset displays the location, boundary, geomorphic classification (wetland type) and management category of wetlands on the Swan Coastal Plain. Where wetland mapping is not available, topographical or other maps may provide a guide to the presence of a wetland but may not correctly define the extent of the wetland's boundary.

In the case of a wetland protected by the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*, the mapped boundaries only indicate the presence of a protected water body. The area with environmental significance is likely to be more extensive than the open water area shown on the maps. DEC wetland mapping will in most cases more precisely define the extent of the wetland.

Where the wetland boundary is not defined on the DEC *Geomorphic Wetlands Swan Coastal Plain* dataset, or the mapping is disputed, the extent of the wetland vegetation should be mapped by a qualified professional based on the characteristics of hydric soils, hydrology and wetland vegetation.

Requests to modify the *Geomorphic Wetlands Swan Coastal Plain* dataset must be submitted to the Wetlands Program at the DEC in accordance with the current protocol (see www.dec.wa.gov.au)

Defining boundaries for extensive wetlands in areas of little topographic relief is complex when the associated vegetation has been cleared or partially cleared. Caution is required when using aerial photography, as it is easy to incorrectly identify portions of remnant vegetation in cleared areas for distinct wetlands. The edge of the extensive wetland may be determined using the criteria outlined in the preceding paragraph.

IDENTIFYING WETLAND BUFFERS

The buffer adjoining a wetland helps to maintain the ecological processes and functions associated with the wetland, and aims to protect the wetland from potential adverse impacts. A buffer can also help to protect the community from potential nuisance insects, for example, midges. To maintain wetland values, it is important to determine, protect and manage an adequate buffer. The DEC measures the buffer from the geomorphic wetland boundary (see 'Identifying Wetland Boundaries' above).

Wetlands that are to be protected require a minimum 50 metre buffer distance. A range of generic buffer distances is provided in Water and Rivers Commission Position Statement: Wetlands (WRC 2001). Alternatively a site-specific buffer requirement may be determined.

The extent of the buffer around a particular wetland should be based on an assessment of:

- the wetland's values
- the activities, land uses or development near the wetland, existing and proposed
- the threats posed by the adjacent activities, land uses or development.

Studies should typically involve site investigations and identify:

- the wetland, and key wetland attributes, for example, vegetation and flora, fauna, hydrology, soils, topography, landscape features, functions and values
- the wetland management category and management objectives
- threatening processes near the wetland (existing and potential), for example, changes to the water regime, weeds, inappropriate recreational use
- the separation and management required to meet management objectives, and the extent to which these can be achieved
- the proposed buffer and key management measures.

A methodology is being prepared for the Wetlands Coordinating Committee and a draft has been released for public comment [*Guideline for the Determination of Wetland Buffer Requirements* (WAPC 2005)]. When finalised and endorsed this methodology will form the basis for determining wetland buffers.

It is recommended that people working on a planning or development project that requires the determination of wetland buffers check the preferred methodology with the relevant decision-making authorities and government agencies likely to be providing technical advice (for example, DEC). If a scheme or proposal needs referral to the Environmental Protection Authority (EPA), the EPA Service Unit can provide advice.

Attachment B4-4

International and national lists of significant wetlands

RAMSAR SITES

At the international level, an influential measure is the **Ramsar Convention** on Wetlands of International Importance, signed initially at Ramsar, Iran, in 1971. This treaty was the first intergovernmental treaty between nations for the conservation of natural resources. Information on the Ramsar Convention and Australian Ramsar sites is available on the Australian Government Department of the Environment and Heritage website at www.deh.gov.au/water/wetlands/ramsar. The updated list of Western Australian Ramsar sites is listed at www.naturebase.net/national_parks/wetlands/wa_ramsar_sites.html.

The broad aim of the Ramsar Convention on Wetlands is to halt the worldwide loss of wetlands and to conserve those that remain through wise use and management. The Department of Environment and Conservation (DEC) has a lead role in recommending Ramsar listings in Western Australia.

The following wetlands and wetland systems in Western Australia are listed for protection under the Ramsar Convention:

- Ord River floodplain
- Lakes Argyle and Kununurra
- Roebuck Bay
- Eighty Mile Beach
- Forrestdale and Thomsons Lakes
- Peel–Yalgorup System
- Lake Toolibin
- Vasse–Wonnerup System
- Lake Warden System
- Becher Point Wetlands
- Lake Gore
- Muir–Byenup System.

A DIRECTORY OF IMPORTANT WETLANDS IN AUSTRALIA

At the national level, the Australian government has a wetlands program and issues a periodically updated list of Australia's nationally important wetlands. At the time of publication of this guidance statement, the latest list is in *A Directory of Important Wetlands in Australia*, third edition (Environment Australia 2001b). It can be viewed on the Australian Government Department of the Environment and Heritage website. (see Australian Wetlands Database www.deh.gov.au > Inland waters > Wetlands > Databases and Information). Western Australia has 120 sites listed. DEC has the lead role in recommending directory listings in Western Australia. These wetlands were previously referred to as Australian Nature Conservation Agency (ANCA) wetlands.

AUSTRALIAN HERITAGE SITES

The Australian Heritage Council Act 2003 introduced the National Heritage List and the Commonwealth Heritage List comprising natural, indigenous and historical heritage places. The Commonwealth Heritage List includes sites with wetlands in Western Australia (see website www.ahc.gov.au).

Some sites on the Register of the National Estate contain wetlands (see the Australian Heritage Council website at www.ahc.gov.au).

Attachment B4-5

Preparing a wetland management plan

For each protected wetland, preparing and implementing a wetland management plan is recommended.

Wetland management plans may vary considerably depending on the issues involved. However, each should contain the basic elements outlined in Attachment A1-2 and in the example below.

Two examples of an outline for a management plan are provided in this guidance statement. One is described below, and the second is in Attachment B2-4 together with references to assist the preparation of a management plan.

EXAMPLE OF CONTENTS FOR A WETLAND MANAGEMENT PLAN

The main sections of this model are as follows:

- **summary of management commitments**
- **introduction**
- **natural environment**
 - climate
 - geology, landform, landscape and soils
 - hydrology
 - vegetation and flora
 - fauna
- **cultural use and appreciation**
 - historical use
 - community use
- **administration, implementation and review**
- **appendices.**

These sections are described below.

Summary of management commitments

This section provides a summary of all the objectives, strategies and key performance indicators described in the document. This may be provided in a table format.

Objectives are broad overarching statements (for example, to conserve flora and vegetation communities).

Strategies are the actions designed to achieve the objectives (for example, monitor the impacts of feral animals on flora values).

Key performance indicators are measurable criteria, which indicate the effectiveness of the management plan (for example, density of understorey vegetation is increased from current levels).

Introduction

This section provides a succinct description of the site, its key values, contextual information, and the purpose of the management plan:

- location, name and description of the site
- current ownership/vesting and management arrangements, zoning, use and infrastructure within and adjacent to the site
- significance of the wetland and surrounds based on conservation, scientific, educational, recreational, commercial, cultural and heritage values in a regional and local context. May outline the history and the sense of place associated with the site (Tizard 2000, Seddon 1972)

- the wetland classification (wetland type), and, if applicable, the assigned wetland management category
- regional, sub-regional and catchment plans which may provide context for the management plan
- legislation or policies that apply to the site (for example, *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*, Wildlife Conservation Act 1950, Bush Forever)
- need for the wetland management plan (incorporating threats, community desire, corporate citizenship)
- purpose and overarching objectives of the plan
- parties participating in the development and administration of the wetland management plan.

Natural environment

This section describes the natural environment, and identifies values, threats, objectives, priorities, criteria for indicating the effectiveness of the management plan, and detailed actions to meet objectives.

- **Climate**
- **Geology, landforms and soils**
 - include any information about soil disturbance, dredging, major earthworks, mining, filling, quarrying,
 - contamination, acid sulfate soils, soil amendment
 - landscape and landforms values
 - threats (for example, erosion, mining, grazing)
 - objectives, strategies, priorities and key performance indicators (as applicable)
- **Hydrology**
 - key catchment characteristics and processes
 - groundwater and wetland hydrology (baseline studies of water quantity can be discussed here)
 - current and future stormwater management
 - current and future water quality including nutrient levels, algae, botulism, heavy metals, and pollutants (baseline studies of water quality can be discussed here)
 - pollution risk management, emergency response, contingency plan-threats to hydrology
 - objectives, strategies, priorities and key performance indicators (as applicable)
- **Vegetation and flora**
 - mapping of vegetation or ecological communities and vegetation condition
 - ecological linkage value
 - identify the boundary of the wetland vegetation
 - flora surveys (see EPA Guidance Statement No. 51) which may be reported in an appendix
 - significant flora, threatened ecological communities
 - dominant weed species and their distribution and vectors (for example, garden dumping,
 - neighbouring properties, birds, animals, mining activities). If applicable, develop a weed management plan outlining manual, chemical and biological weed removal strategies and methods and schedule including information on any chemicals to be used (which may be placed in an appendix)
 - dieback and other diseases presence and distribution. If applicable, develop a dieback mapping and dieback management plan (which may be placed in an appendix)
 - fire history, impact and role of fire, location of firebreaks. If applicable, develop a fire management plan (which may be placed in an appendix)
 - introduced fauna impact (for example, rabbits, camels, cattle, goats)
 - threats to flora-objectives, strategies, priorities and key performance indicators (as applicable)

- **Fauna**

- presence of fauna (for example, water birds, terrestrial birds, amphibians, reptiles, mammals, fish and invertebrates, including mosquitos and midges)
- fauna survey (see EPA Guidance Statement No. 56) which may be reported in an appendix
- significant fauna
- important areas for fauna habitat
- issues concerning human interaction with fauna (for example, feeding of gulls, kangaroos, parrots, swans)
- current and potential wildlife corridors
- presence of introduced fauna (for example, cats, rabbits, foxes, camels, Argentine ants, ducks, mosquito fish, sheep, cattle, horses, goats, rats/mice, dogs, donkeys)
- threats to fauna-objectives, strategies and key performance indicators (as applicable).

Cultural use and appreciation

This section describes human use and appreciation issues, and identifies values, threats, objectives, priorities, criteria for indicating the effectiveness of the management plan, and detailed actions to meet objectives.

- **Historical use**

- historical use and management
- Aboriginal heritage significance (include ethnographic and archaeological surveys and reports in appendix)
- European and other heritage significance (include research reports in an appendix)- objectives, strategies and key performance indicators (as applicable)

- **Community use**

- current passive and active recreational uses of the site, resource-based uses (for example, quarrying, firewood collection) -community groups active on the site and the potential for active community groups to look after the site
- planned future uses such as passive recreation, active recreation, education, heritage site, scientific research (include any community survey results and public consultation results) showing consideration of the natural landscape, hydrology, flora and fauna of the site, and exposure to risks such as snake bite, accidents and crime (consider liability and insurance). A recreation plan and education plan may be included in an appendix
- implications for conservation objectives
- access control and location of facilities required (for example, road access, access and facilities for people with disabilities, walk trails, boardwalks, dog walking access and facilities, bridle trails, rubbish bins, seating, signage, toilets, water taps, car parks, picnic facilities, food facilities, lighting, educational facility, interpretive signage, perimeter and internal fencing, turnstiles, fire breaks, emergency vehicle access, maintenance vehicle access, supply vehicle maintenance, utility maintenance access [for example, Water Corporation access to maintain and inspect drains], monitoring stations, groundwater monitoring bores), showing consideration of the natural landscape, hydrology, flora and fauna of the site
- objectives, strategies and key performance indicators (as applicable).

Administration, implementation and review of wetland management plan

- agency or group with overall responsibility for the wetland management plan
- consultation with community and key stakeholders: process, length, feedback and negotiation
- membership of implementation coordinating committee/working groups
- procedures for adoption of the wetland management plan
- term of the wetland management plan
- procedures for interim evaluation of the wetland management plan
- procedures for review of the wetland management plan
- management agency or agencies responsible for individual recommendations/ commitments

- funding and staff; volunteers to be utilised
- include a funding plan
- implementation schedule based on, for example, priorities of recommendations, seasonal determinants, funding, receiving necessary approvals
- community liaison and involvement in implementation (include communication plans in an appendix)
- performance reporting, assessment, audit and review procedures.

Appendices

Consider:

aerial photographs	water pollution contingency plan	consultation program
maps	dieback management plan	list of stakeholders
recreation plan	management plan	action calendar (for example in Gantt chart)
education plan	fauna reintroduction plan	communication plan
pest management plan	funding plan	glossary
fire management plan	evaluation plan and evaluation form	references
construction management plan	news clippings	acronyms.

Chapter B5

Waterways

B5.1 SIGNIFICANCE OF WATERWAYS

Waterways are significant state assets for environmental, social and economic reasons. They are important because they:

- provide habitat for aquatic and terrestrial fauna and flora, and support a rich biodiversity
- support fish habitat including breeding areas
- drain land, transport and store water, and carry flood waters
- assist with a range of essential natural processes including the formation of soils and attenuation of pollutants
- have ecosystem linkage values, for example, in substantially cleared areas they are often the only corridors for wildlife
- provide drinking and domestic water
- provide water for agricultural and industrial use
- provide food and aquaculture opportunities
- provide settings for tourism
- provide navigation routes and locations for harbours and jetties
- provide opportunities for recreation and community activities, for example, swimming, boating, picnicking, fishing, marroning, walking, and nature appreciation
- are a significant part of Aboriginal and non-Indigenous heritage
- provide distinctive landscape features and have aesthetic values
- provide an attractive setting for urban and residential development, and contribute to a locality's sense of place.

The *Western Australian State Sustainability Strategy* (Government of Western Australia 2003a) highlights the importance of the state's waterways and establishes the objective to manage aquatic systems to agreed conditions for a range of environmental values through a **catchment management** approach.

TERMS

Waterways for the purposes of this guidance statement consist of:

- river and stream systems including permanent, seasonal and ephemeral drainage lines
- wetlands connected to the stream systems (that is, those wetlands fed mainly by rivers and streams)
- lakes, estuaries or inlets at the base of these systems
- and, depending on the context, may include the floodplains of the above.

Estuaries are a special type of waterway where terrestrial waters and marine waters mix. They characteristically support a high level of biological productivity. Many species of birds, fish, invertebrates and mammals depend on estuaries for feeding, spawning and nursery grounds.

The **foreshore area** is the biophysical area that defines a river system including river channels, floodway, flood fringe and associated vegetation.

The **foreshore buffer** is the additional distance required between foreshore area and any proposed development to help manage the condition of the waterway.

A **foreshore reserve** is the area agreed to be set aside for purposes associated with public activity. Eg conservation and recreation.

The **fringing vegetation** or **riparian vegetation** is the vegetation adjacent to the water body and directly dependent on the proximity of the waterway. Fringing vegetation can include both wetland and dryland vegetation. Fringing vegetation helps to maintain the integrity of the waterway by providing habitat for many aquatic and terrestrial species, stabilising the waterway banks, dissipating water energy, providing ecological corridors, and limiting the export of sediment and nutrients.

The **catchment** of a waterway is the area adjoining the waterway that contributes surface runoff and groundwater to the waterway. Land uses, development and water management practices in the catchment can directly, indirectly and cumulatively impact on the health and integrity of waterways.

The **floodplain** is the extent of the land near a waterway that may be flooded. In Western Australia, Department of Environment and Conservation (DEC) guidelines for floodplain management differentiate between the **floodway** (where no development or filling should occur) and the **flood fringe** (the portion of the floodplain outside the floodway where some development may occur).

A catchment management approach is important because the health of a waterway depends not only on what happens within and along the waterway itself, but also on the natural processes, land uses and management practices in its surface water and groundwater catchments.

Maintaining a healthy waterway requires an appreciation of the processes that support the particular waterway, how they may be impacted and problems that can arise. Information on Western Australian waterways is available in publications from the Department of Water (DoW). These include *River Restoration Manual* (WRC 1999-ongoing), *The Importance of Western Australia's Waterways* (Department of Environment 2004d) and *Managing Our Rivers* (Pen 1999).

Waterways management requires consideration of the whole water cycle. Advice on **total water management** and the management of water quality is in Chapter C3. Other Part B chapters and Part D chapters also provide advice on particular waterways issues.

B5.1.1 THREATS AND ISSUES

Waterways have deteriorated in quality as a consequence of activities and developments along the waterways and in their catchments (WRC 2000a). This has placed a focus on the need for the sustainable management of waterways.

Some impacts (threats) and issues that affect waterways are identified in the checklist below.

CHECKLIST OF THREATS AND ISSUES FOR OUR WATERWAYS

Works and activities that may individually or cumulatively adversely impact on the values associated with a waterway, and that may be influenced by planning processes and other decision-making and management processes, include the following:

- ☐ clearing of native vegetation in the catchment and along a waterway
- ☐ the application of nutrients and use of chemicals in the catchment associated with agricultural, urban and other activities
- ☐ construction and ground-disturbing activities contributing to erosion and the export of sediment
- ☐ dredging and disposal activities
- ☐ inappropriate stormwater and wastewater management in the catchment
- ☐ draining saline waters from salinity-affected areas into a waterway
- ☐ taking water out of a waterway
- ☐ altering the course of a waterway (river training)
- ☐ controlling water flows, for example, dams, weirs
- ☐ filling
- ☐ excavating and mining
- ☐ discharge of effluent
- ☐ changed fire regimes along waterways and in catchments
- ☐ introduction of weed and pest species
- ☐ increased human activity generally along waterways and in catchments

The above activities have contributed to the following issues and problems associated with waterways

- ☐ unsustainable use of waterways
- ☐ salinisation in inland waters
- ☐ loss of biodiversity values
- ☐ nutrient enrichment (eutrophication) and algae growth
- ☐ acid sulfate soil disturbance problems
- ☐ erosion of banks
- ☐ sedimentation
- ☐ turbidity, low oxygen, temperature different to natural variability, contamination, acidification
- ☐ flooding issues
- ☐ the spread of weeds, diseases, predators
- ☐ mosquito and midge nuisance
- ☐ loss of visual amenity, heritage and cultural values.

B5.2 EPA'S BROAD PRINCIPLES FOR THE PROTECTION OF WATERWAYS

EPA's objective

The EPA's objective for waterways is to maintain their integrity, ecological functions and environmental values (EPA 2004e).

The position of the Environmental Protection Authority (EPA) is that all waterways have environmental significance. Each waterway and its catchment needs to be carefully managed through the informed efforts of the people whose activities and decisions directly or indirectly affect the waterway's health, based on the following principles.

Maintaining ecological health

It is preferable to maintain the natural dynamic water regime of each waterway in terms of water quality, water course alignment, flow quantity and the timing of flows in and entering the waterway.

Protection and management through an integrated approach

A cooperative and integrated approach is essential to address issues relating to waterways and land use and development in the catchment. The EPA supports effective involvement of all stakeholder groups and the community and strong linkages between planning and management processes involving land use planning, catchment management, waterways management, total water management and natural resource management.

Decisions on land use, development and management along a waterway and in each waterway catchment should preferably occur within the framework of an integrated land use and natural resource/water management strategy or similar.

Models for management

The EPA recommends that management strategies for the protection of waterways and other natural resources are based on the model set out in EPA Position Statement No. 8 *Environmental Protection in Natural Resource Management* (EPA 2005a) or the State Water Quality Management Strategy Report No. 6 *Implementation for Western Australia for the Australian and New Zealand Guidelines for Fresh and Marine Water Quality Monitoring and Reporting* (Government of Western Australia not dated). An example of the application of the model is Riverplan: An Environmental Management Framework for the Swan and Canning Rivers (Government of Western Australia 2004c).

Informed management and decision-making

Decisions on land use, development and management along a waterway and in each catchment need to be made on an informed basis, taking into account waterway and catchment processes and attributes, and related environmental values, issues and threats to values (see B5.1) as well as the significance of the waterway, and the potential for direct, indirect and cumulative impacts from development. Catchment modelling tools such as the LASCAM model may be useful in this regard. Information to assist decision-making on a project should also be sufficient to show that **best practice** measures have been identified and will be applied, and that environmental objectives will be met.

Environmental objectives

While each waterway needs to be kept ecologically sound and healthy and degraded waterways and buffers rehabilitated, the EPA recognises that a hierarchy of levels of protection is necessary to accommodate human uses and values and maintain ecosystems. The level of protection assigned to a waterway or a portion of a waterway should preferably result from an accredited and consultative process that includes the identification of environmental objectives, priorities and criteria for the waterway system.

In catchments where a thorough consultative process to develop waterways management objectives has not been completed, the EPA recommends that a precautionary approach be taken

to decision-making on projects that may directly, indirectly or cumulatively affect waterways.

No loss of the waterway function or any agreed water quality criteria should occur as a result of incremental developments.

The EPA urges that action is taken to improve environmental outcomes for waterways where possible.

Areas of high conservation significance

The EPA considers that the waterways and associated buffers identified in B5.2.2 that are of high conservation significance and should be fully protected and conserved. There will be other areas where the conservation values of a reach or tributary of a waterway may necessitate consideration of similar protection and conservation approaches to those listed in B5.2.2

Having regard for the generally high environmental significance of estuaries, the EPA urges that estuarine works such as reclamation, excavation and marinas are avoided.

There will be other areas where the conservation values of a reach or tributary of a waterway may necessitate consideration of similar protection and conservation approaches to those listed in B5.2.2

Waterway buffer protection

A key to waterways protection is the identification, protection, rehabilitation and management of the waterway and identification of appropriate buffers distances. The process for identifying waterway foreshore areas is outlined in Attachment B5-1. It is also important to identify buffer distances from the foreshore area to development.

Waterways and their buffers should be managed to maintain or enhance the environmental values and objectives agreed for the waterway, and in particular, for ecological and hydrological values.

Other compatible values may also require protection and management actions, for example, heritage values, educational opportunities, scientific research, visual amenity and appropriate recreation. Some buffer management mechanisms are outlined in B5.3.2. Degraded waterways and their buffers should be rehabilitated.

Separation of land uses from the waterway

Land uses and developments near a waterway should be setback from the waterway. As far as practicable, land use activities and development should be located outside the foreshore area. To minimise the risk of adverse impacts on waterways, some uses and developments with a potential for polluting discharges will need to be at a greater set-back from the waterway than the boundary of the general purpose buffer.

The floodplain

Development in the floodplain should generally be avoided to protect the important function of floodplains to contain and transport floods. However, limited development in accordance with an overall plan for the management of the floodwaters and the protection of the environmental values of a waterway may be acceptable, following appropriate investigations and on advice of the relevant agencies including DoW (see Attachment B5-2).

B5.2.1 EPA'S PUBLISHED POSITION

The EPA has prepared the following environmental protection policies of relevance to particular waterways and waterway catchments:

- *Environmental Protection (Swan and Canning Rivers) Policy 1998 (Government of Western Australia 1998c)*
- *Environmental Protection (Peel Inlet–Harvey Estuary) Policy 1992 (Government of Western Australia 1992b)*
- *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 (Government of Western Australia 1992a)*

Implementation of the Environmental Protection (Peel Inlet–Harvey Estuary) Policy 1992 is largely through the application of the Western Australian Planning Commission's State Planning Policy No

2 The Peel–Harvey Coastal Plain Catchment (Government of Western Australia 1992c).

The principal mechanism for implementation of the *Environmental Protection (Swan and Canning Rivers) Policy 1998* is *Riverplan: An Environmental Management Framework for the Swan and Canning Rivers* (Government of Western Australia 2004c).

A number of the EPA publications in Chapter E2 provide advice relevant to aspects of waterways protection.

B5.2.2 AREAS OF HIGH CONSERVATION SIGNIFICANCE

The EPA considers that the portions of waterways and their buffers in the areas listed below require a high level of protection during strategic planning, decision-making and ongoing management:

- wild rivers recognised by the DoW and Commonwealth Department of Environment and Heritage (Attachment B5-3)
- areas endorsed by government for inclusion in the conservation estate
- areas recommended for protection in the Systems ‘Red Book’ reports (Department of Conservation and Environment 1976–1983) except in areas where recommendations are superseded by later proposals approved by government
- areas reserved through the planning process for purposes which include conservation
- **ecological linkages** that connect high value conservation areas
- key habitat areas, for example, key fish breeding areas and areas on which birds that are the subject of the **JAMBA** and **CAMBA** migratory bird agreements depend
- other areas with significant vegetation, **significant flora or significant fauna** (see A2.3 items 2 and 3)
- areas that include significant wetlands, for example, Ramsar wetlands (Attachment B4-4), wetlands listed in the latest update of *A Directory of Important Wetlands in Australia* (Environment Australia 2001b) and **conservation category wetlands** (see Attachment B4-2)
- public drinking water supply catchments (see Chapter B6)
- all estuaries and inlets and their associated wetlands and buffers, except for portions agreed for uses such as ports following public processes accepted by the EPA
- areas that include important landscapes or landforms (Chapter B8) or sites of high heritage significance (Chapters D1 and D2)
- other waterway areas recommended for conservation by recognised authorities following rigorous processes as accepted by the EPA.

B5.3 CONSIDERING WATERWAYS DURING PLANNING

The EPA’s advice in this chapter complements the guidance in the *Water Resources State Planning Policy 2.9* (WAPC 2006) and should be read in conjunction with it. The Western Australian Planning Commission (WAPC) policy recognises that planning has an important role in protecting, conserving and enhancing water resources. Advice is provided in Schedule 1 of the draft WAPC policy specifically for the following planning mechanisms: planning strategies and structure plans; planning schemes and their amendments; and subdivision and development applications.

Key policies and overarching strategies relevant to the protection of waterways are identified in Table B1.

Key agencies that provide advice or regulate activities or developments of relevance to the protection of waterways and land use planning are as follows (also see Table A1): Department of Environment and Conservation (DEC), Department of Water (DoW), Swan River Trust, EPA, WAPC, Department for Planning and Infrastructure (DPI), local governments, Department of Agriculture Western Australia, Department of Fisheries, Department of Industry and Resources (DoIR), Department of Health (disease vector mosquitoes), sewer service providers and stormwater managers, for example, the Water Corporation. Regional and local natural resource and catchment management groups also have a significant role and information base in some areas, for instance, the Geographe Catchment Council (GeoCatch).

The DoW is a key source of technical advice and information on waterways, catchment protection and natural resource management issues. The DoW also administers approval processes for specified developments and actions in designated areas to protect water resources, and prepares water management and resource protection plans. Proclaimed areas and waterways management areas (Attachments B5-4 and B5-5) are subject to special legislative requirements. See Chapter B6 for public water source areas. A selection of DoW publications are in E4.

B5.3.1 BROAD SCALE PLANNING

The advice in this section should be read in conjunction with the EPA's recommended considerations during broad scale planning in A1.4.1 and the *Water Resources State of Planning Policy 2.9* (WAPC 2006).

The EPA stresses the importance of co-ordinating strategic planning and planning decision-making with integrated catchment and natural resource management. Aspects of natural resource management of particular relevance to waterways include but are not limited to biodiversity protection, total water management and land care.

In catchments where there are development pressures and a propensity for waterways problems, the EPA is of the view that development in the catchment (other than insignificant development) should not proceed unless it can be demonstrated that adverse environmental impacts on water resources including waterways will be avoided and that an adequate strategy and supporting mechanisms are in place to ensure that waterway and catchment objectives will be met.

It is strongly recommended that an overall approach to identifying and managing foreshore buffers for major and minor waterways is developed during broad scale planning processes.

B5.3.2 LOCAL AREA PLANNING

Here is a checklist of selected management measures that assist the protection and enhancement of the environmental values of waterways. The checklist is followed by discussion on each measure as an aid to planning and decision-making on large and small projects in waterway catchments.

Further advice relevant to local area planning is provided in A1.4.2 and the *Water Resources State of Planning Policy 2.9* (WAPC 2006).

The EPA expects that protection and management measures will be implemented through approved plans and strategies, scheme requirements (for example, special control provisions, subdivision conditions and development conditions) as appropriate.

CHECKLIST OF MANAGEMENT MEASURES FOR WATERWAYS	
<input type="checkbox"/> Waterways and their buffers	protect and rehabilitate them
<input type="checkbox"/> 'Hard edges' to foreshore reserves	provide them
<input type="checkbox"/> Ecological linkages	maintain and rehabilitate them
<input type="checkbox"/> Construction near waterways	manage very carefully
<input type="checkbox"/> Livestock access	control access
<input type="checkbox"/> Waterway crossings	design carefully
<input type="checkbox"/> Acid sulfate soils	investigate the risks thoroughly and observe WAPC and DoW guidelines
<input type="checkbox"/> Setbacks from waterways	maintain adequate setbacks
<input type="checkbox"/> Mosquitoes	adopt setbacks and suitable control measures
<input type="checkbox"/> Regional or local area water management plan	prepare plan and integrate development with it to meet catchment objectives
<input type="checkbox"/> Stormwater management	Manage stormwater quality and quantity at source and throughout catchment
<i>continued...</i>	

CHECKLIST OF MANAGEMENT MEASURES FOR WATERWAYS

<input type="checkbox"/> Environmental management plans	prepare and implement site-specific plans
<input type="checkbox"/> Flooding	observe DoW guidelines
<input type="checkbox"/> Locating and managing land uses in the catchment	locate and manage development so that surface and groundwater are protected and catchment objectives are met
<input type="checkbox"/> Dams	manage their location and impacts
<input type="checkbox"/> Existing drains	where these do not meet catchment objectives, redesign to meet DoW stormwater management principles

Waterways and their buffers

Waterways, including minor drainage lines and their buffers, should be protected and degraded waterways and buffers should be rehabilitated.

The extent of the foreshore area should be determined through the application of an appropriate methodology, for example, the DoW methodology outlined in Attachment B5-1. The application of buffers will then depend on the size and condition of the waterway and the intensity of the pressure form of the proposed development.

The EPA strongly supports and encourages the establishment of foreshore reserves along waterways, particularly in the following situations:

- in closely settled areas
- along waterways popular with the public
- in areas of conservation significance
- where due protection of the buffer may not otherwise be ensured.

The adequacy of an existing foreshore reserve should be assessed where appropriate. It may be necessary to increase the width of the foreshore reserve. In areas where incremental development is likely, it is recommended that foreshore reserve requirements are determined during the strategic planning stages ahead of any individual development and subdivision.

General development and land use should be excluded from the waterway foreshore area, including the buffer areas of minor drainage lines.

Where minimum impact development activities are compatible with the purpose of the foreshore area (paths, picnic areas) or essential infrastructure is required (roads), careful consideration needs to be given to the appropriate location, design and management of the development to minimise adverse environmental impacts, for example, removal of vegetation, disturbance of fauna, erosion or the entry of pollutants.

The EPA's position on mitigation measures for impacts on environmental assets is in Position Statement No. 9 Environmental Offsets (EPA 2006a). Further guidance can be obtained from the EPA's Draft Guidance Statement on Environmental Offsets (EPA 2007c).

Management of the foreshore areas and their buffers in accordance with an approved and enforceable foreshore or buffer management plan is urged. Management actions may alternatively be in an environmental management plan for the site, for example, a farm management plan. Where development along a waterway is likely to occur in an incremental way, and the foreshore area or reserve will be gradually augmented, a comprehensive foreshore management plan for the eventual extensive reserve is generally preferred to repetitive individual plans. However, individual plans may add detail to an overall foreshore management plan. The essential components of environmental management plans are in Attachment A1-2. Examples of detailed components are in Attachments B2-4 and B4-5.

Where development pressures do not warrant a full environmental management plan for the buffer, planning and decision-making should nevertheless ensure protection and management actions will be implemented where appropriate. The specific location where management actions are required may need to be shown on a map.

Fragmentation of ownership over waterways, their foreshores and their buffers should be avoided. Examples of management actions that assist the protection of waterways include:

- retain all remnant native vegetation both riparian and dryland in the buffer
- protect ecological linkages
- limit access by fencing and gates
- repair degraded/eroded portions of foreshore
- revegetate riparian and adjoining dryland zones using indigenous species of local provenance
- remove inappropriate uses, infrastructure
- remove or redesign inappropriate stormwater management facilities
- remove weeds and vermin
- remove/repair inappropriate crossings.

Detailed guidance is provided in a range of DoW publications (see Chapter E4).

'Hard edges' to foreshore reserve

Hard edges, for example, roads and pathways adjoining foreshore reserves, are recommended. These enable public surveillance, deter vandalism and help control the spread of weeds and grass.

Maintaining ecological linkages

It is desirable to protect and enhance ecological linkages and to increase the buffer or foreshore reserve width in places to connect with remnant vegetation. Waterways sometimes provide the main opportunities for ecological linkages in developed areas.

Construction near waterways

Any clearing and construction activities that have the potential to drain to waterways, including works outside the buffer, should be timed and managed so as to minimise the risk of increasing stream sedimentation, turbidity and pollution. At the completion of works, stabilise the site and revegetate with local native species where appropriate.

Livestock access

Waterways should be protected from damage by livestock. Identify the buffer and waterway areas to be protected by fencing, and carefully consider the location and management of any stock watering points, vehicular and stock crossings (see DoW Water Notes in E4 for more information).

Waterway crossings

Crossings should be located and designed so as not to cause any erosion to the riverbanks or degradation of the waterway buffer area. Waterway crossings should be at suitably hardened areas. Culverts should be designed to prevent any restrictions on aquatic faunal movement and water flows (see WRC 1999 for more information).

Acid sulfate soils

In estuarine, floodplain and wetland areas (existing and geologically recent) the potential for acid sulfate soils should be considered and investigated as appropriate (see Chapter B7 and WAPC 2003b). Disturbing these soils can raise significant management issues, and preferably should be avoided.

Setbacks from waterways

A setback larger than the standard buffer or foreshore setback is likely to be appropriate for a land use or activity associated with a high potential for water contamination or nutrient export, for example, some forms of intensive agriculture and some effluent treatment facilities. The actual setback will depend on the design and layout of the development, the technology and management measures to be utilised, and the extent to which management practices are enforceable.

Mosquitoes

Development near water bodies may raise mosquito management issues. The EPA encourages adequate setbacks to minimise the need for chemical controls and physical alteration of foreshore areas. If controls are needed, measures that maintain healthy waterways and wetland ecosystems and are consistent with the conservation significance of the waterway should be adopted. The EPA has provided guidance on the management of mosquitoes during land development in EPA Guidance Statement No. 40 (EPA 2000c).

Regional or local area water management plan

Where incremental development is likely, the EPA promotes the prior preparation and adoption of a strategy at an appropriate scale that integrates land use planning and total water management to meet catchment and waterways objectives based on best management practices (see Chapter C3).

Stormwater management

For each development, stormwater should be carefully managed at source and throughout the catchment consistent with stormwater management objectives adopted for Western Australia. Guidance on stormwater management is provided in the Department of Water *Stormwater Management Manual for Western Australia* (DoW 2004-2007).

Stormwater management is addressed in Chapter C3.

Environmental management plans

Where environmental management plans and actions can be made enforceable, these can assist in protecting waterways. Consider conditions to manage water use, stormwater, irrigation water, effluent, industrial process water, nutrients (for example, fertilisers), chemicals, spills, wastes, erosion.

Flooding

Where a project is below the 1 in 100 year flood line as defined by the DoW (or subject to flooding if not mapped by the DoW), consider the appropriateness of the location for development and whether fill or flood mitigation measures are acceptable, in consultation with the DoW. Key environmental functions and values of the flood prone area should be maintained.

In floodplains mapped by the DoW, DoW recommends avoiding development in the portion of the floodplain designated as the floodway, as outlined in Attachment B5-2. In areas subject to flooding that have not been mapped by DoW, or where a proponent considers that a sustainable outcome can be achieved, the acceptability of a project may depend on the technical findings and proposed management actions set out in reports by appropriate experts.

Locating and managing land uses in the catchment

New land uses, zones and developments that are associated with a risk of contaminating surface and groundwater under typical management practices (including general industrial development and residential development) should not be located in areas where the soils and hydrological conditions are such that, in time, adverse impacts on the health of waterways are likely. If development is to proceed in such areas, it needs to first be demonstrated that special management measures are available and will be put in place to ensure that there will be no unacceptable deterioration in either the surface water or groundwater.

Uses associated with a potential for pollution or site contamination should be subject to evaluation and enforceable management requirements. Advice is provided in Part C. It should be noted that licensing of **prescribed premises** under Part V of the *Environmental Protection Act 1986* (EP Act) does not

A wide range of guidelines for dealing with categories of land uses and developments that can impact on water resources (direct and indirect) have been prepared by government agencies. Chapters E3, E4 and E5 include useful references.

Dams

Approval through the land use planning process may be desirable for some categories of dams. While some are subject to DoW permitting, it is not always the case. It is recommended that the potential environmental and social impacts of the proposed dam are evaluated and if these are significant, construction should not take place. Cumulative impacts of dams on major and minor waterways should be considered.

If impacts are considered not to be significant by recognised authorities, an enforceable operational strategy for the use, storage and release of water should be prepared prior to construction of the dam. The strategy should make provision for the environmental water requirements of downstream aquatic flora and fauna as well as the rights of downstream riparian water users. Flexibility should be incorporated into the operational strategy in case new information becomes available, for example, on environmental water requirements. Compliance with the provisions of the operational strategy should be audited on a regular basis.

The dam should be properly constructed so as to meet nationally accepted standards for engineering.

Existing drains

Consideration should be given to relocating, redesigning and managing inappropriate urban and rural artificial drains. Urban Stormwater drains should be retrofitted in accordance with the stormwater management principles and approaches in the Department of Water *Stormwater Management Manual for Western Australia* (DoW 2004). Consider redesigning and managing existing drains to emulate the characteristics of natural waterways. Where practicable, in buffer areas along drains plant native riparian and dryland vegetation to support a healthy, ecologically functioning waterway.

B5.4 REFERRAL TO THE EPA

Advice on how to refer a scheme to the EPA is set out in A3.2.1. Advice on when and how to refer a proposal to the EPA is set out in A4.2.1.

Examples of schemes and proposals that the EPA has assessed because of the potential impacts on waterways include estuarine marinas and urban development projects involving major new or incremental development in catchments on the Swan Coastal Plain.

B5.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

With respect to the environmental factor 'waterways', the main triggers for the referral of a proposal to the EPA pursuant to s38 EP Act are the likelihood of a significant environmental impact (direct, indirect, or cumulative):

- on an area of high conservation significance as set out in B5.2.2
- from dredging, filling or realigning or other major change to a waterway or its buffer
- from subdivision, development or activities in the catchment likely to contribute to eutrophication or other waterway problems
- on the foreshore area of a waterway.

The checklist of pre-referral steps and the referral indicators in Figure A4 and Attachment A4-1 will assist decision-making authorities to decide whether to refer a proposal to the EPA.

B5.4.2 INFORMATION TO ACCOMPANY A REFERRAL

Information that assists the EPA to set an appropriate level of assessment on a referred scheme or proposal in relation to waterways and waterway catchment issues generally includes:

- identification of any waterways on and near the site, and their environmental significance
- identification of relevant catchment specific issues, for example, salinity, acid sulfate soils
- aerial photography, with the scheme or proposal area and key components of development and land use superimposed

- where development is likely to directly impact on or abut a waterway or its buffer, a report on the attributes of the waterways area and mapping identifying an appropriate buffer based on a recognised methodology (for example, the DoW methodology outlined in Attachment B5-1)
- identification of existing and potential ecological corridors connecting with or along waterways
- identification of any relevant regional natural resource/water resource/catchment studies and management plans
- identification of environmental values associated with the site
- advice on any site-specific investigations that have been carried out or are proposed
- description of any potential impacts on waterways and their buffers that are likely to directly or indirectly result from the development, including construction impacts
- description of the measures proposed to mitigate the potential impacts on waterways (consider the management of stormwater, irrigation or process water, wastes, nutrients, other potential contaminants, spills)
- a list of any other approvals that may be required
- the results of any consultation carried out, including the comments of other authorities, for example, DoW (or advise if these are to be obtained).

In some instances the EPA may request additional information. Where further information is required and where possible, please provide all relevant data in digital and GIS format.

Determining foreshore reserves

This is a summary of *Determining Foreshore Reserves* (WRC 2002). The full document should be referred to. It is available on the Department of Water (DoW) website at www.water.wa.gov.au.

The methodology is primarily used to determine foreshore areas adjoining waterways. The determination of waterway buffers will depend on the size and condition of the waterway and the intensity of the adjacent land use proposed where the buffer is not required to be ceded as a foreshore reserve, but nonetheless requires protection and special management.

Protection and management of foreshore areas is essential for maintaining healthy waterways and wetlands. Protected foreshores preserve aquatic, littoral and terrestrial habitat for native flora and fauna while providing amenity and maintaining scenic quality and landscape values. An important role of buffers is to reduce erosion, sedimentation, nutrients and contamination influx in waterways.

Biophysical criteria used by the DoW methodology to determine appropriate protective buffer areas are:

- **vegetation:** fringing and upland remnant vegetation associated with or influencing the waterway
- **hydrology:** flood-prone land and areas subject to waterway or channel changes
- **soil type:** soil types that define the extent of foreshore vegetation
- **erosion:** soil types prone to erosion
- **geology:** geological features that influence the waterway
- **topography:** landscape features including slope, shape and composition of landforms that influence or are influenced by the waterway
- **function:** the foreshore function, that is, flood protection, recreation, habitat conservation
- **habitat:** habitats such as river pools, woody debris, riffles, riparian vegetation
- **climate:** climatic variations and resultant changes in water levels
- **land use:** areas that may be harmed by increased land use pressure
- **heritage:** archaeological and ethnographic sites.

Identification of the biophysical factors of a waterway yields a foreshore reserve area appropriate for the maintenance and protection of that waterway. Other factors that also need to be considered are addressed in WRC (2001c).

See over for the four-step checklist of the tasks required to assess and determine any foreshore area.

CHECKLIST FOR DETERMINING FORESHORE RESERVES

Step 1 Background

- ☐ Understand the waterway, its significance and the management issues.
- ☐ Obtain aerial photos to assess vegetation complexes, river form, function and adjacent land uses.
- ☐ Obtain maps showing the extent of floodway and floodplains, topographical features, cadastral boundaries, soils, underlying geology and vegetation complexes.
- ☐ Obtain any relevant reports on the river and region. This may include floodplain mapping, development proposal and flora and fauna survey reports.
- ☐ Plan a site visit once you are confident you have the necessary background information.
- ☐ Negotiate and communicate with relevant stakeholders as required.

Step 2 Identifying the biophysical criteria of the waterway

- ☐ Identify the extent of the riparian vegetation.
- ☐ Identify soils that support riparian vegetation.
- ☐ Locate the floodway and floodplain 1-in-100-year flood levels, peak flow and river hydrology.
- ☐ Identify any soil types prone to erosion.
- ☐ Identify landforms, including any drainage lines that may be important to watercourse function.
- ☐ Identify valuable habitat areas for terrestrial and aquatic species.
- ☐ Identify adjacent land use pressures with the potential to affect the foreshore.
- ☐ Investigate and identify any other factors influencing decisions on foreshore widths, such as Aboriginal sites, other heritage sites, and residential and recreational amenity.
- ☐ Negotiate and communicate with relevant stakeholders as required.

Step 3 Are there any other factors you need to consider?

- ☐ Identify any other issues that may be relevant, for example, maintaining visual and residential amenity, maintaining links with adjoining remnant vegetation or wetlands.
- ☐ Analyse any risks and consequences resulting from the proposed foreshore alignment.

Step 4 Finalising the alignment and presentation of information

- ☐ Prepare an annotated diagram showing the foreshore delineation determined from the above criteria.
- ☐ Provide the rationale for the delineation in the form of a brief report.

Floodplain management guidelines

Flooding along a river or stream occurs when sufficiently heavy or prolonged rainfall produces runoff which overflows the banks of the watercourse. Similarly, low-lying land adjacent to coastlines and estuaries may be flooded as a result of extremely high tides or storm surges accompanying storms.

Problems arise when settlement occurs in flood-prone areas along rivers and coastlines (Pen 1999). The response to development in flood-prone areas has generally been the construction of flood mitigation works such as channel clearing and levees. However, these works may themselves cause problems as they transfer more energy to floodwaters. The river may dig a deeper and wider channel, move more sediment and damage property. Inappropriate placement of levees may also cause flooding of land upstream.

The clearing of native vegetation in catchments is associated with an increase in some forms of flooding.

Some flooding is required to maintain ecological processes and biodiversity. Most ecological communities along waterways depend on periodic inundation, consistent with the variability of natural events.

Flood management must therefore be a combination of conveyance and containment to control the volume of water on the move and the energy contained within it, with regard to environmental and human values.

Flood management is an important consideration in land use planning. Key objectives of floodplain management are to protect environmental values, convey floods and ensure that the risk to human life and property is within acceptable standards. With these objectives in mind, the DoW has developed guidelines for development within the floodplain.

DoW GUIDELINES FOR DEVELOPMENT WITHIN THE FLOODPLAIN

For floodplain management purposes, the DoW has identified two parts of the floodplain, the floodway and the flood fringe. These parts of the floodplain are represented in Figure B4 (see over).

The **floodway** is defined by DoW as the river channel and a portion of the floodplain which forms the main flow path for floodwaters once the main channel has overflowed. If the floodway is even partially blocked upstream flood levels may be raised and affect areas which may not have been previously affected. The DoW strongly recommends against development in the floodway.

The **flood fringe** is the area of the floodplain outside of the floodway that is affected by flooding but where development could be permitted (from a flooding perspective only) provided appropriate measures are taken. These areas are generally covered by still or very slow moving waters during a 100-year average recurrence interval flood.

Floodplain mapping has been completed for the waterways in Table B4 as of May 2005 (see over).

Some information on other waterway systems may be available from the DoW, local Councils and catchment groups. Alternatively, local knowledge, old aerial photography or site evidence may indicate previous flood levels.

Figure B4. Floodplain development strategy recommended by DoW

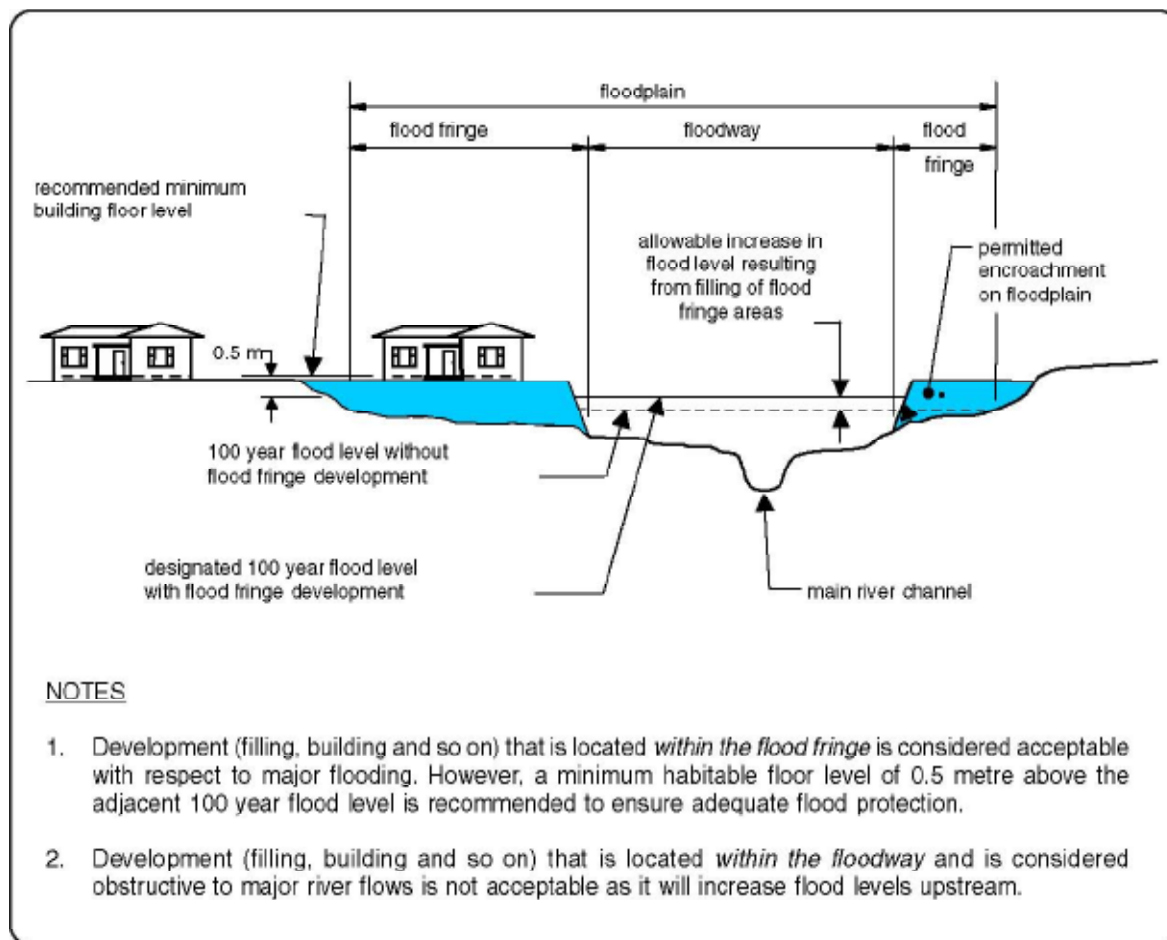


Table B4. DoW floodplain mapping for Western Australian rivers

River	Study Area	Format
Swan River	Fremantle to Walyunga	Digital
Helena River	Swan River to Helena Valley	Digital
Bennett Brook	Swan River to Mussel Pool	Digital
Blackadder Creek	Swan River to Wexcombe	Digital
Jane Brook	Swan River to Wexcombe	Digital
St Leonards Creek	Swan River to Henley Brook	Digital
Susannah Brook	Swan River to Millendon	Digital
Henley Brook	Swan River to Gnangara Road	Digital
Ellen Brook	Swan River to Bullsbrook	Digital
Canning River	Canning Bridge to Brookton Highway	Digital
Southern River–Wungong Brook	Canning River to South West Highway	Digital
Neerigen Brook	Wungong Brook to Albany Highway	Hard copy
Peel Inlet	Peel Inlet-Harvey Estuary	Digital
Murray River	Peel Inlet to Pinjarra	Digital
Serpentine River	Peel Inlet to South West Highway	Digital
Mandurah Channel	Indian Ocean to Peel Inlet	Digital
Leschenault Estuary	Leschenault Estuary	Digital
Preston River	Leschenault Estuary to Riverlands - Bunbury	Digital
	Donnybrook	Digital
Eedles Gully	Preston River to Bunbury Aerodrome	Digital
Five Mile Brook	Bunbury	Digital
Collie River	Leschenault Estuary to Australind Bypass	Digital
	Collie	Digital
Brunswick River	Collie River to Australind Bypass	Digital
Busselton	Busselton	Digital
Toby Inlet	Quindalup	Digital
Blackwood River	Augusta to Warner Glen Bridge	Digital
	Nannup	Hard copy
	Bridgetown	Hard copy
	Boyup Brook	Hard copy
Gordon River	Tambellup	Hard copy
Yakamia Creek	Albany	Digital
Denmark River	Denmark	Hard copy
Moore River	Moora	Digital
Avon River	Beverley	Digital
	York	Digital
	Northam	Digital
	Toodyay	Digital
Gribble Creek	Kalgoorlie-Boulder	Digital
Harding River	Roebourne	Hard copy
Chapman River	Geraldton	Digital
Irwin River	Dongara	Hard copy
Gascoyne River	Carnarvon	Digital
Fitzroy River	Fitzroy Crossing	Digital

Attachment B5-3

Wild rivers in Western Australia

Table B5. Wild rivers: Pristine and near pristine catchments recognised by the Commonwealth Department of Environment, Water, Heritage and the Arts

Drainage Division	River Name	River Basin
Timor Sea	'Cape Whiskey' and others (creeks unnamed)	Drysdale
	Doubtful River	Prince Regent
	Gibson Creek	Prince Regent
	Glenelg River	Prince Regent
	Helby River	Pentecost
	Hunter River	King Edward
	Jinunga Creek	Isdell
	'Londonderry' Creek unnamed	Drysdale
	'Mt Grey' and others (creeks unnamed)	Prince Regent
	'Mt Page' Creek (unnamed)	Isdell
	Prince Regent River	
	'Scott' River (unnamed)	King Edward
	Stewart River	Isdell
	Thompson River	Pentecost
	Thurburn and others (creeks unnamed)	Pentecost
	Wade and Rocky Cove Creeks (and others unnamed)	King Edward
	Walmar and Canal Creeks	Pentecost
Western Plateau	Herbert Wash	Salt Lake
	Ponton Creek	Salt Lake
	Rudall River	Sandy Desert
	Savory Creek	Sandy Desert
Indian Ocean	Tanberry Creek	Port Hedland Coast
	Upper Robe River	Onslow Coast
South West	Dempster River	Albany Coast
	Forth River	Shannon
	St Mary River	Albany Coast

Mapping for these rivers and their catchments is available from DoW.

Table B6. Wild rivers: Additional catchments recognised by DoW

River Name	Drainage Division	River Basin
Berkeley River	Timor Sea	Drysdale
Bulla Nulla Creek (and others unnamed)	Timor Sea	Pentecost
Calder River	Timor Sea	Isdell
Chamberlain River	Timor Sea	Pentecost
Charnley River	Timor Sea	Isdell
Forrest River	Timor Sea	Pentecost
King Edward River	Timor Sea	King Edward
King George River	Timor Sea	Drysdale
Lawley River	Timor Sea	King Edward
Lyne River	Timor Sea	Pentecost
Moran River	Timor Sea	Prince Regent
Pentecost River	Timor Sea	Pentecost
Placid, Dominic, Nosedda Creeks	Timor Sea	Drysdale
Roe River	Timor Sea	Prince Regent
Sale River	Timor Sea	Prince Regent
Salmond River	Timor Sea	Pentecost
Sturt Creek	Western Plateau	Mackay
Upper Yule River	Indian Ocean	Port Hedland Coast
Blackwater Creek	South West	Shannon
Deep River	South West	Shannon
Doggerup Creek	South West	Shannon
Inlet River	South West	Shannon
Shannon River	South West	Shannon

Mapping for these rivers and their catchments is available from DoW.

Attachment B5-4

Proclaimed areas (surface water) under the *Rights in Water and Irrigation Act 1914*

The *Rights in Water and Irrigation Act 1914* provides for the regulation of interference with watercourses and drains. Under this Act, permission is required in proclaimed surface water areas (see Table B7 below) to undertake works that alter the bed or banks of a waterway or to extract water. Mapping of proclaimed surface water areas is available from the Department of Water (DoW).

Table B7. Proclaimed areas (surface water) under the Rights in Water and Irrigation Act 1914

Proclaimed areas (surface water)	
Avon River Catchment Area	Balingup Surface Water Area
Avon River System	Bolganup Creek Surface Water Area
Brunswick River and tributaries	Canning Dam Surface Water Area
Canning River and tributaries	Churchman's Brook Surface Water Area
Capel River and tributaries	Dumpling Gully Surface Water Area
Dandalup River	Hester Surface Water Area
Derby	Limeburners Creek Dam Surface Water Area
Donnelly River, tributaries and catchment area	Millstream Surface Water Area
Eneabba Creek, its tributaries and catchment	Mullalyup Surface Water Area
Ferguson River and tributaries	Mundaring Weir Surface Water Area
Fitzroy River and tributaries	Ravensthorpe Surface Water Area
Gascoyne River and tributaries	Tanjannerup Creek Surface Water Area
Gingin Brook, tributaries and catchment area	Two People's Bay Surface Water Area
Greenough River, tributaries and catchment area	Victoria Dam Surface Water Area
Hill River, tributaries and catchment	Wungong Dam Surface Water Area
Margaret River and tributaries	Wyndham Water Supply Surface Water Area
Moore River and certain tributaries	
Murray River, tributaries and catchment area	
Neerigen Brook	Camballin Irrigation District
Ongerup Town Water Supply Area	Carnarvon Irrigation District
Ord River and tributaries	Collie River Irrigation District
Pilbara Area	Harvey Irrigation District
Preston River and certain tributaries	Ord Irrigation District
Serpentine River	Preston Valley Irrigation District
Stoney Brook and tributaries	Waroona Irrigation District
Swan River and tributaries	
Warren River, tributaries and catchment area	
Wungong and Southern River	

Attachment B5-5

Waterways conservation areas and the Swan River Management Area

WATERWAYS CONSERVATION AREAS

Under the *Waterways Conservation Act 1976*, five management areas have been established for the conservation of waterways and associated land. The management areas apply to:

- Wilson Inlet and associated rivers
- Albany Harbour and associated rivers
- Avon River
- Peel–Harvey estuaries
- Leschenault Estuary and associated rivers.

SWAN RIVER MANAGEMENT AREA

Under the *Swan and Canning Rivers Management Act 2006*, special development controls apply to all land and waters within the Swan and Canning Rivers Development Control Area.

Chapter B6

Public drinking water sources

B6.1 SIGNIFICANCE OF PUBLIC DRINKING WATER SOURCES

The *State Sustainability Strategy* (Government of Western Australia 2003a) highlights the significance of drinking water protection:

'Fresh water is one of the most important natural resources of Western Australia. The community expects that its drinking water will be safe to drink and that sufficient amounts will be available to meet current and future consumer requirements... Public drinking water supplies are obtained from groundwater and surface water resources. Groundwater and rivers feeding town water supply are obviously critical to our economic and social survival. In Western Australia there are approximately 140 sources that need to be protected...'

The major groundwater aquifers in the Perth Metropolitan Region are the Gnangara and Jandakot Mounds. In the Perth metropolitan area approximately 50% of the public water supply comes from surface water and the remainder from these groundwater sources. Other groundwater aquifers also supply water to towns north of Perth and the major regional centres of Geraldton, Bunbury and Albany. The majority of surface water supplies come from dams in the Darling Scarp and the south west of the State.

Both surface water and groundwater catchments are under pressure from competing uses including industry, intensive agriculture, recreation and urban development. Care is needed to ensure that incompatible land use and development does not contaminate groundwater and surface water making them unsuitable for human consumption.'

As human activities become more intensive in a catchment, contamination risks increase. The risk of contamination is lowest in those catchments under native vegetation with little human activity.

Although many contaminants can be removed from water by water treatment processes, water treatment increases the cost of water supply, and it is not technically or economically feasible to remove all contaminants. Historically, a heavy reliance was placed on treating water to achieve the desired level of safety, but it is now recognised that treatment alone does not remove all hazards to public health. Therefore, to maximise public health safety, effective catchment protection is needed. In Western Australia, preventing contamination is considered to be the best approach, as endorsed by a range of recent government initiatives including the *State Water Strategy* (Government of Western Australia 2003d). A study by the United States Environmental Protection Agency found that on average the cost of removing contamination might be 30 to 40 times that of preventing contamination in the first place (Environmental Protection Agency – United States 1995).

The important role of the land use planning system in protecting public drinking water sources in Western Australia is emphasised in a number of parliamentary committee and government reports, including the Western Australian Legislative Assembly Select Committee Report on *Metropolitan Development and Groundwater Supplies* (1994) and the *Report of the Standing Committee on Ecologically Sustainable Development in Relation to the Quality of Perth's Water Supply* (Standing Committee on Ecologically Sustainable Development 2000).

Information on the history and current practice of protecting Public Drinking Water Source Areas (PDWSAs) in Western Australia is provided in the Department of Water's (DoW) Water Quality

TERMS

Public Drinking Water Source Areas (PDWSAs) are areas proclaimed by legislation to protect drinking water source catchments.

- **Underground Water Pollution Control Areas** are proclaimed over shallow groundwater stores under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909*.
- **Catchment Areas** are proclaimed over the surface water catchments of dams under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or the *Country Areas Water Supply Act 1947*.
- **Water Reserves** are declared over potential surface water and groundwater catchments or existing groundwater public drinking water sources under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or the *Country Areas Water Supply Act 1947*.

Protection Note *Overview on Protecting Public Drinking Water Source Areas* (www.water.wa.gov.au). Some of the measures used by DoW to protect PDWSAs are in Attachment B6-1. The locations of PDWSAs are shown indicatively in Attachment B6-2. These may change as new sources are identified or existing sources are replaced. Current advice on the location of existing and proposed PDWSAs is available from regional offices of the DoW or the local water service provider (for example, Water Corporation).

This chapter does not address all issues relating to the protection of drinking water supplies and land use planning, for example, protecting private drinking water sources where connection to a reticulated public water supply is not available is not specifically addressed. This may be a locally significant issue for land use planning in some areas.

B6.2 EPA'S BROAD PRINCIPLES FOR THE PROTECTION OF PUBLIC DRINKING WATER SOURCES

EPA's objectives

The EPA's objectives for public drinking water sources are to ensure that:

- *groundwater and surface water resources used for public water supply are protected in accordance with the Australian Drinking Water Guidelines (NHMRC & ARMCANZ 2001 as periodically updated)*
- *land uses which could affect the quantity and/or quality of water are appropriately managed.*

The Environmental Protection Authority (EPA) recognises the following principles for the protection of public drinking water sources.

- Protection of public drinking water sources is a key environmental and public health issue.
- Fundamental steps in providing a long-term supply of safe, good quality drinking water to protect public health are effective catchment protection through co-ordinated agency and community effort, and appropriate treatment of water.
- Catchments likely to be required in the future for drinking water supply must have timely protection to prevent inappropriate land use decisions.
- To minimise the potential for adverse impacts on PDWSAs, the EPA urges that people carrying out approved activities implement continuous improvement and adopt **best practice** measures (EPA 2004a, EPA 2003c).
- Protection of PDWSAs should be guided by the implementation framework recommended in the State Water Quality Management Strategy series (see E4.2 and Government of Western Australia not dated in E1).

The implementation framework (Government of Western Australia, not dated) recommends the identification and development of environmental values, environmental objectives and performance **benchmarks** (standards) for each of the state's significant water resources through a consultation process involving the community. The outcome of this implementation framework should be sustainable water resources that meet the needs of the State, communities and the environment.

The EPA's position is consistent with a holistic or integrated approach to **natural resource management** (NRM). The EPA recognises that the drinking water value of a water resource exists alongside other environmental values, for example, maintaining ecological systems and aquatic systems such as wetlands and waterways. When considering any proposals for additional water supplies, the EPA will take into account the maintenance of the water regime of ecosystems, particularly those of conservation significance. The EPA has expressed concern about the effect of the lowering of groundwater levels on wetlands of the Gngangara Mound (EPA 2004m).

Key guidance for new land uses or developments or expansion of existing activities in Priority 1, 2 and 3 areas in PDWSAs is provided in the Department's Water Quality Protection Note *Land Use Compatibility in Public Drinking Water Source Areas* (E4). As this is updated from time to time to take into account new management practices, the latest version on www.water.wa.gov.au should be consulted. DoW priority classification system for PDWSAs is outlined in Attachment B6-1.

B6.2.1 EPA'S PUBLISHED POSITION

PDWSAs that the EPA has to date focussed on include the Gnangara Mound and the Jandakot Mound. The *Environmental Protection (Gnangara Mound Crown Land) Policy 1992* (Government of Western Australia 1992d) was prepared by the EPA and released in 1992 in tandem with a statement of planning policy for the Gnangara Mound Crown Land.

In 2002, the EPA published the *Implementation Framework for Western Australia for the Australian and New Zealand Guidelines for Fresh and Marine Water Quality in Water Quality Monitoring and Reporting (Guidelines Nos 4 & 7: National Water Quality Management Strategy)* (EPA 2002c). This is the precursor to the Western Australian Government's publication of the same name (Government of Western Australia not dated).

B6.3 CONSIDERING PUBLIC DRINKING WATER SOURCES DURING PLANNING

The EPA supports the valuable role of the planning system at every level of the planning process in ensuring the protection of public drinking water supply catchments. The EPA acknowledges the considerable support for the protection of PDWSAs in state planning policy and recent planning strategies, for example, the draft Middle Helena Catchment Area Land Use and Water Management Strategy (WAPC 2003d).

Policies

Key government policies, overarching strategies and statements of planning policy relevant to the protection of public drinking water sources in Western Australia are listed in Table B1.

The EPA supports the implementation of the following key advice summarised from the State Planning Policy No. 2.7 Public Drinking Water Source Policy (Government of Western Australia 2003e):

- Local and regional planning strategies should identify existing and proposed PDWSAs based on timely advice from the Department of Water.
- In the Perth Metropolitan Region, Priority 1 and Priority 2 (see Attachment B6-1) source protection areas should be included in the Water Catchments reservation or the Rural Water Protection zone or covered by a special control area for water protection in the Metropolitan Region Scheme and corresponding town planning schemes. In Priority 3 areas, land use decisions should have regard to the Department's Water Quality Protection Note *Land Use Compatibility in Public Drinking Water Source Areas* (Note: It is important to use the latest version available on (www.water.wa.gov.au)).
- Outside the Perth Metropolitan Region, all priority source protection areas should be shown as special control areas in region schemes and town planning schemes in accordance with the recommendations of any relevant land use and water management strategy published by the Western Australian Planning Commission (WAPC) or any source protection plan approved by the Department of Water. The special control area provisions should provide for referral of applications to the department for advice and comment, and set out the relevant considerations in determining planning applications within these areas, guided by the Department of Water's Water Quality Protection Note *Land Use Compatibility in Public Drinking Water Source Areas*.
- Land uses and development in all priority source protection areas that have the potential to impact detrimentally on the quality and/or quantity of water should not be permitted unless it can be demonstrated by the proponent, on advice from the Department of Water, that such impacts can be satisfactorily managed.
- Decision-making on planning schemes and land use should take into account any adopted region scheme policy or relevant environmental protection policy on public drinking water supply.

The role of the DoW

Key agencies that regulate activities and development or provide advice of relevance to land use planning and the protection of public drinking water sources are listed in Table B1. The roles of these agencies are outlined in Table A1.

The role of the DoW is of particular relevance to land use planning. The DoW is responsible for defining and proclaiming PDWSAs and has developed detailed advice to assist planning and other agencies, specific industries and the public to protect drinking water supplies. Key departmental guidelines and policies for PDWSAs are listed in Chapter 4.

The DoW (or delegated agent) prepares Drinking Water Source Protection Assessments (most often prepared by Water Corporation) and Drinking Water Source Protection Plans in consultation with stakeholders and the public, for the state's PDWSAs, to guide the protection of specific drinking water sources. Amongst other matters, these plans generally identify priority classification areas (Priority 1, 2 or 3) and protection zones (that is, Wellhead Protection Zones and Reservoir Protection Zones). These terms are briefly described in Attachment B6-1. More detail on the meaning and use of priority classification areas, protection zones and specific by-laws can be found in the Water Quality Protection Note *Overview on Protecting Public Drinking Water Source Areas* (www.water.wa.gov.au).

A list of completed drinking water source protection assessments and plans is on the department's website www.water.wa.gov.au.

The department is also required to consider the protection of drinking water supplies in the context of sharing water resources equitably between environmental, social and economic needs. To ensure that provision is made for the environment in water allocation decision-making, **ecological water requirements** and **environmental water provisions** are determined by the department. Further information is provided in Statewide Policy No. 5 *Environmental Water Provision Policy for Western Australia* (www.water.wa.gov.au).

A departmental policy for protecting public drinking water sources was finalised in 2005. Through the ongoing implementation of the State Water Strategy, a government-level policy document may also be prepared.

The control of some activities within public drinking water source areas is possible under legislation administered by Department of Water, for example, by laws under the *Metropolitan Water Supply Sewerage and Drainage Act 1909* and the *Country Areas Water Supply Act 1947*. However, the broader control of new land use in the three priority source protection areas (P1, P2, P3) currently relies on the land use planning system.

B6.3.1 BROAD SCALE PLANNING

The EPA recommends that the checklist opposite be applied by planners, decision-makers and others involved in broad scale planning processes, in order to protect PDWSAs.

This checklist is indicative only, and additional considerations may be relevant in specific cases.

B6.3.2 LOCAL AREA PLANNING

Depending on the extent to which the protection of existing and potential PDWSAs has been considered during the formulation of strategic plans and town planning schemes, the checklist opposite may also be relevant when formulating town planning scheme amendments, detailed structure plans and during decision-making on subdivision and development applications.

The EPA recommends that consideration is given to:

- the acceptability of the location of the proposed land use or development having regard to PDWSA protection
- the detailed design, intensity of development and management measures to be implemented
- enforceable development requirements. The protection of the water resource may be assisted by conditions requiring the preparation and implementation of environmental management plans for developments and land uses based on best practice; revegetation; repair of degraded or contaminated areas; continuous improvement of environmental management; monitoring of impacts; and contingency plans to be implemented in the event of specified triggers
- consultation with the DoW and other stakeholders.

CHECKLIST FOR DRINKING WATER SOURCE PROTECTION

- ☐ Identify PDWSAs, their priority classifications and any Wellhead Protection Zones and Reservoir Protection Zones in relation to the planning area (see Attachment B6-1).
- ☐ Identify any proposed PDWSA's, their likely future use and proposed priority classifications
- ☐ Identify key characteristics of the water resources of the planning area, including the actual catchments (groundwater and surface water) of the public drinking water source (sometimes these differ from the proclaimed PDWSA).
- ☐ Identify key environmental conditions in potential development areas that may influence water quality, for example, acid sulfate soil risk areas.
- ☐ Identify existing and potential issues relating to any PDWSA and the water resources of the planning area. Examples of issues relevant to planning are:
 - ☐ managing land uses to protect water quality and quantity in existing public water supply areas (including the catchments of the supply areas where these are greater than the legislated supply area)
 - ☐ protecting water supplies for future use
 - ☐ recognising the drinking water requirements of people against competing social, economic and environmental objectives
 - ☐ recognising the need to maintain environmental water requirements (that is, the water regime needed to maintain ecological values of water dependent ecosystems at a low level of risk)
 - ☐ factoring in the potential public health consequences of planning decisions in PDWSAs.
- ☐ Consider all relevant policies and plans including Water Source Protection Plans and Assessments (<water.wa.gov.au>), water and catchment management strategies (for example, land use and water management strategies), environmental protection policies (see B6.2.1), State planning policy (see Table B1) and DoW guidelines in E4 in particular the Water Quality Protection Note Land Use Compatibility in Public Drinking Water Source Areas.
- ☐ Identify potential impacts from preferred development options on water quality and quantity and the extent to which these are consistent with water resource protection objectives and criteria.
- ☐ Consult with relevant agencies (Table B1), stakeholders and the public.
- ☐ Locate new development areas to avoid adverse impacts on public drinking water sources.
- ☐ Identify how issues related to public drinking water sources and key water resources will be managed at each subsequent stage of planning. Planning measures may include:
 - ☐ establishing reservations, zones and special control areas in schemes, consistent with State Planning Policy No. 2.7 Public Drinking Water Source Policy
 - ☐ recognising the issue in planning scheme objectives and in documents supporting planning schemes and structure plans
 - ☐ preparing local planning guidelines for the protection of PDWSAs to assist decision-making on subdivision and development applications.

Guidance on the compatibility of land uses in PDWSA Priority 1, 2 and 3 areas is provided in the Department's Water Quality Protection Note *Land Use Compatibility in Public Drinking Water Source Areas* (Important note: the latest version on the department's website www.water.wa.gov.au. should be used). Other useful departmental guidelines for protecting PDWSAs are listed in Chapter E4.

A checklist of activities and land uses that require special consideration in PDWSAs is below. Most of these items are not acceptable in Priority 1 areas.

CHECKLIST OF IMPACTS REQUIRING SPECIAL CONSIDERATION

- ☐ Clearing of vegetation
- ☐ Abstraction of water
- ☐ Filling of land (use clean fill only)
- ☐ Urban and industrial development: The DoW guidelines preclude these land uses in P1 and P2 areas. Commercial and residential land use activities may be compatible land uses in P3 areas if connected to reticulated sewerage.
- ☐ Major transport routes: Major transport routes need to be carefully located and managed, and should incorporate mechanisms to prevent contamination of water quality, given the risk of accidents involving a chemical or fuel spill. P1 areas should be avoided.
- ☐ Special rural development: Land use activities or development should not be introduced at a density that has the potential to impact on water quality. Consider the siting, type and density of wastewater disposal systems especially in areas with poor land drainage or a shallow depth to groundwater. Alternative wastewater treatment systems, where approved by the Department of Health, may be accepted with maintenance requirements.
- ☐ Agricultural and Horticultural activities
- ☐ Fertiliser and pesticides: Any permitted activity reliant on fertilisers and pesticides should have an approved management plan in place.
- ☐ Stock grazing: Animal stocking levels (number of animals per hectare) should be consistent with water source protection objectives.
- ☐ Storage of chemicals: Storage and use of fuels and chemicals should be consistent with the advice in the appropriate DoW Water Quality Protection Notes (see E3.6).
- ☐ Stormwater, wastewater and waste management: Consider requiring compliance with an approved environmental management plan.
- ☐ Disturbance of acid sulfate soils: Avoidance of disturbance is preferred. Guidelines for management are in WAPC (2003b) and the DEC acid sulfate soil series listed in E3.10.

B6.4 REFERRAL TO THE EPA

This section should be read in conjunction with the general requirements for the referral to the EPA of schemes and proposals in A3.2.1 and A4.2.1.

B6.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

The EPA expects that any proposal that is not consistent with the Water Quality Protection Note *Land Use Compatibility in Public Drinking Water Source Areas* (latest version) will not be approved by a decision-making authority. Referral of the proposal to the EPA under s38 Environmental Protection Act 1986 (EP Act) should be considered if it is not likely to be refused.

Referral should also be considered if the advice of any agencies responsible for the protection of drinking water is not likely to be adopted and the implementation of the proposal could have a significant impact on a public drinking water source.

B6.4.2 INFORMATION TO ACCOMPANY A REFERRAL

When a scheme or proposal is referred to the EPA and there is a potential for a significant impact on an existing or future public drinking water source, the following information will assist the EPA to set the appropriate level of assessment:

- location of the site in relation to the PDWSA or proposed PDWSA
- PDWSA priority classification of the site, and whether the site is impacted by a Wellhead Protection Zone or Reservoir Protection Zone (see Attachment B6-1)
- potential sources of contamination (for example, wastewater, chemicals storage facilities, fertilisers, agricultural sprays, stormwater disposal)
- any proposed water abstraction
- comments and outcomes arising from any consultation with agencies (including the Department of Water) and the community
- proposed methods for managing potential sources of contamination and protecting the water quality and quantity of the PDWSA.

In some instances the EPA may request additional information. Where further information is required and where possible, please provide all relevant data in digital and GIS format.

Priority Source Protection Areas, Wellhead Protection Zones and Reservoir Protection Zones

This section outlines some mechanisms adopted by the Department of Water (DoW) to protect Public Drinking Water Source Areas (PDWSAs). It is not always appropriate to apply the same level of protection across PDWSAs. The department has therefore identified three levels of water quality protection called priority classification areas or priority source protection areas, as well as Wellhead Protection Zones and Reservoir Protection Zones.

PRIORITY SOURCE PROTECTION AREAS

Priority 1 (P1) source protection areas are defined to ensure there is no degradation of the water resource. They cover land normally owned by the state (Crown land) where the provision of the highest quality drinking water is the prime land use value. P1 areas are managed with the principle of risk avoidance. Where non-confirming land uses exist in a P1 area, it is policy to retain the P1 classification to ensure the primacy of the land for drinking water supplies is noted.

Priority 2 (P2) source protection areas are defined to ensure that there is no increase in risk of pollution to the water source. P2 areas are declared over land where low intensity development (such as rural) already exists. Protection of public water supply sources is a high priority in these areas. P2 areas are managed in accordance with the principle of risk minimisation and some development is allowed under specific guidance.

Priority 3 (P3) source protection areas are defined to limit the risk of pollution to the water source. P3 areas are declared over land where water supply sources need to co-exist with other land uses such as residential, commercial and light industrial developments. Protection of P3 areas is achieved through management advice and action rather than restrictions on land use. If the water source does become contaminated, water supplies may need to be treated or an alternative water source found.

WELLHEAD PROTECTION ZONES AND RESERVOIR PROTECTION ZONES

Wellhead Protection Zones and Reservoir Protection Zones are defined to protect the water source from contamination in the immediate vicinity of production wells and reservoirs.

Wellhead Protection Zones are usually circular, with a radius of 500 m in P1 areas and 300 m in P2 and P3 areas.

Reservoir Protection Zones usually consist of a 2 km buffer area around the top water level of a reservoir and include the reservoir itself. These zones do not extend outside water reserves. Special conditions apply within these zones. Guidance on recreation activities in Reservoir Protection Zones is provided in Statewide Policy No. 13 *Policy and Guidelines for Recreation within Public Drinking Water Source Areas on Areas of Crown Land* (www.water.wa.gov.au).

Attachment B6-2

Public Drinking Water Source Areas in Western Australia

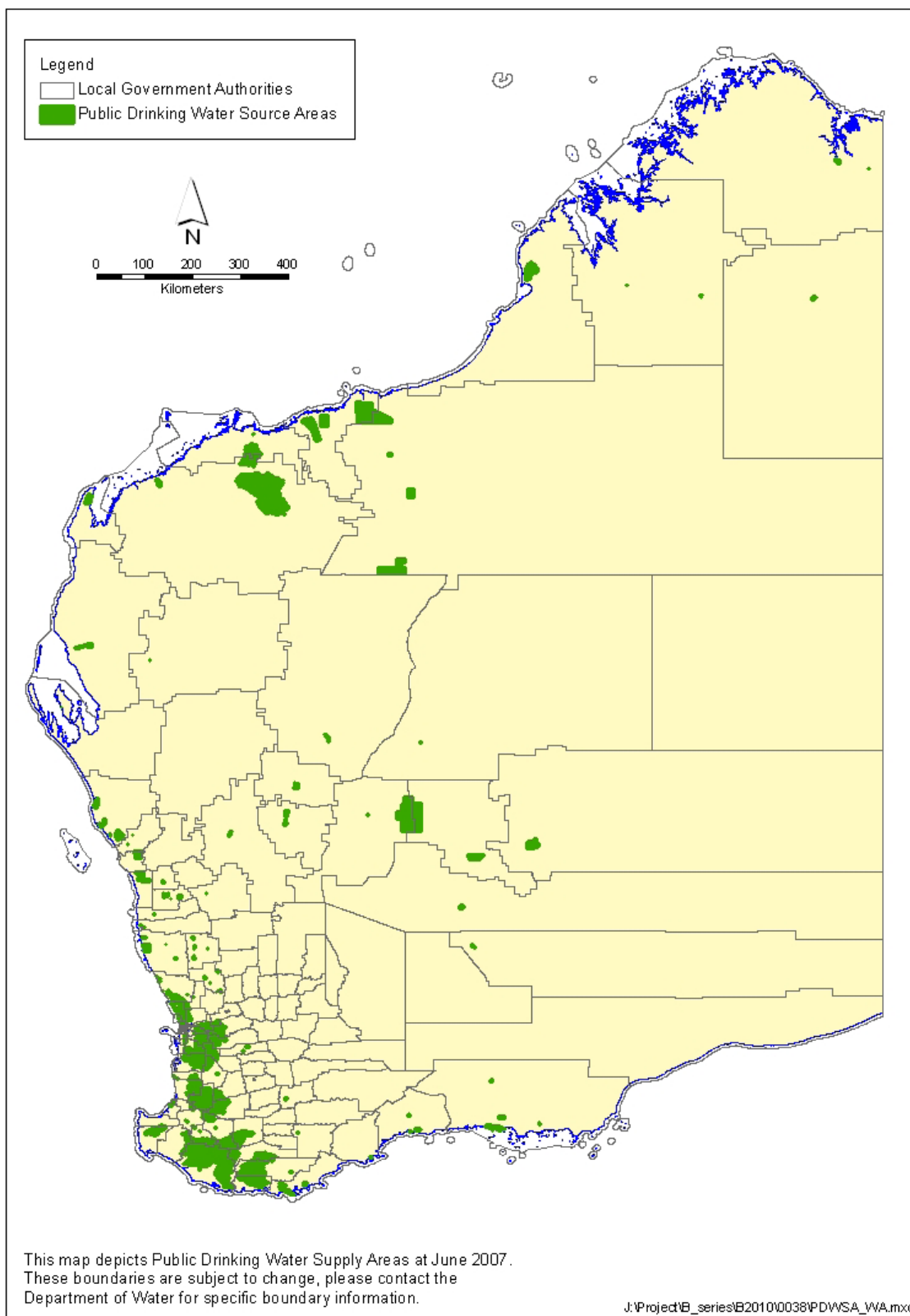


Figure B5. Public drinking water source areas in Western Australia (available at www.water.wa.gov.au).

Water Quality Protection Notes and Guidelines

The Department of Water (DoW) produces a number of documents providing information on how different land uses may impact upon WA's drinking water supplies. These documents also provide useful guidance on ways to minimise the impacts of these land uses on water resources.

WATER QUALITY PROTECTION NOTES

Water Quality Protection Notes are provided for activities that may impact on the quality of the state's water resources. They are designed to convey the DoW's view on land use activities and water resource protection issues. The aim is to ensure that the department's advice is consistent and that land use planners have an understanding of the factors considered when proposals are assessed.

The notes provide a basis for developing formal best management practice guidelines in consultation with key stakeholders. They are recommendations only, and may be varied at the discretion of the department. They provide a general guide on issues of environmental concern and offer potential solutions based on professional judgement and precedent. The notes do not override any statutory obligation or government policy statement.

WATER QUALITY PROTECTION GUIDELINES

Water quality protection guidelines aim to address key issues relating to industrial, commercial and urban activities that interact with the Department's water resources conservation and management role, and provide advice on best management practice.

The guidelines are developed through a consultative process involving all stakeholders. These include other government agencies, industry representatives and conservation organisations. Inter-agency guidelines aim to combine the requirements of each agency into a single document providing a 'one-stop-shop' for industry and community stakeholders.

Both the Water Quality Protection and guidelines are available on the DoW website (www.water.wa.gov.au). A full list of these is included in Chapter E. Feedback on all documents is welcome and constructive comments will be considered when these documents are reviewed.

Other planning and development issues may be covered by the statewide policy documents also available on the DoW's website, a list of which is included in Chapter E.

Chapter B7

Land degradation

B7.1 SIGNIFICANCE OF LAND DEGRADATION

Land degradation is a very serious environmental and community problem in Western Australia. In 1991, the Western Australia Legislative Assembly reported that land degradation in Western Australia arising from salinity, soil acidification, wind and water erosion, waterlogging, soil structure decline, water repellence and sub-soil compaction affected 47 million hectares of land (including 27 million hectares in the rangelands). A 1995 estimate put the area affected at around 57 million hectares (Agriculture Western Australia 1999).

The Natural Resource Management Council (NRMC) has identified salinity as the greatest environmental threat facing Western Australia with 1.8 million hectares in the south-western agricultural area affected. Projections show that by 2050, over 30% of the south-western agricultural region (around 8.8 million hectares) will be at risk of salinity from shallow water tables (www.nrm.org.au).

TERMS

Land degradation is 'the decline in condition or quality of the land as a consequence of human activities' (Government of Western Australia 1998a). For the purposes of this Guidance Statement, land means the soil and subsoil resource at the Earth's surface. Land degradation issues include salinity, wind and water erosion, waterlogging, soil compaction, soil structure decline, soil acidification, land slip or subsidence, and acid sulfate soils.

B7.1.1 CAUSES AND IMPACTS

Some of the causes and significant impacts associated with land degradation are listed below.

Causes

- removal of the original vegetation and replacement with shallow-rooted plants, for example, crops and pastures
- earthworks
- drainage works, including the drainage of saline water
- irrigation systems
- compaction of soil by vehicles and animals
- fertilising and pesticide spraying
- grazing animals
- weeds and pests
- lengthy exposure of soil to weather
- disturbance of potential acid sulfate soils
- land management practices with short-term economic objectives.

Impacts

- deterioration of **ecosystems** and the **ecosystem services** associated with the natural environment
- loss or decline of agricultural soils, productivity and rural incomes
- deterioration of areas of conservation significance
- regional and local loss of biodiversity
- the salinisation, eutrophication and contamination of inland waters, and sedimentation
- adverse affects on downstream activities that depend on a healthy biophysical environment, including commercial fishing, recreation and tourism activities
- loss or deterioration of water sources for drinking, irrigation and other purposes
- increased flood risk
- health risks to people, for example, from acid sulfate soils

- deterioration of buildings and infrastructure, for example, from rising saline groundwater and waterlogging
- deterioration of visual amenity, for example, in landscapes with a high rate of plant deaths
- costs to the community in terms of financial outlay, community amenity and the community's and government's time and effort in managing impacts and rehabilitating disturbed areas.

Many forms of land degradation have proven to be very difficult to manage. Sometimes attempts to solve one type of land degradation problem have given rise to another. For example, draining to dispose of saline groundwater has in some places lead to soil acidification.

Introductory information on land degradation issues in the broad regions of the state is available on www.nrm.org.au. The *State Sustainability Strategy* (Government of Western Australia 2003a) provides an overview of issues.

Key sources of information include the Western Australian Land Information System at www.walis.wa.gov.au, the Department of Agriculture, the Department of Environment and Conservation (DEC), and regional natural resource management groups (see Table B1 and Part E). Information on acid sulfate soil is at www.dec.wa.gov.au. A preliminary indication of acid sulfate soil risk areas is in Western Australian Planning Commission (WAPC) Planning Bulletin No. 64 (WAPC 2003b) at www.wapc.wa.gov.au/publications.

It is noted that detailed investigations are usually required to confirm risk areas and their particular characteristics on specific properties.

B7.2 EPA'S BROAD PRINCIPLES ON LAND DEGRADATION

EPA's objective

The EPA's objective for land is to maintain its integrity, ecological functions and environmental values (EPA 2004e).

The EPA recognises that land degradation is one of Western Australia's most serious environmental problems, and stresses the importance of adopting ecologically sustainable land management practices.

Land managers and decision-making authorities are encouraged to:

- Base decision-making and management with respect to natural resource management on a systematic approach analogous to the **environmental management system** approach (AS/NZS ISO 14001:2004 and AS/NZS ISO 14004:2004).
- Avoid all further land clearing as far as practicable, for the reasons outlined in the EPA's Position Statement No. 2 *Environmental Protection of Native Vegetation in Western Australia* (EPA 2000a).
- Become adequately informed on the potential direct, indirect and cumulative impacts of land management actions on-site and off-site.
- Maintain the key ecological functions of the land, and biodiversity.
- Consider **land suitability**, and avoid inappropriate use and development of land that is prone to degradation.
- Investigate and implement **best practice** measures (EPA 2003c) for ecologically sustainable land management.
- Restore degraded land and natural resources, and promote revegetation.
- Manage natural resources sustainably irrespective of economic conditions at enterprise and industry scale.
- Support the overarching natural resource management framework for Western Australia, and strategies consistent with this framework.

The EPA's position and management framework for natural resource management is set out in Position Statement No. 8 (EPA 2005). The EPA's model involves identifying environmental values to be protected; identifying associated issues and threats; setting priorities and environmental objectives; establishing environmental criteria/indicators/targets; preparing an implementation strategy; monitoring and reporting; and performance review and improvement.

B7.2.1 EPA'S PUBLISHED POSITION

The EPA's published position on the management of land and land degradation issues in particular regions is as follows:

- **Rangelands** – EPA Position Statement No. 5 *Environmental Protection and Sustainability of the Rangelands in Western Australia* (EPA 2004c)
- **Peel-Harvey Estuary catchment** – *Environmental Protection (Peel Inlet-Harvey Estuary) Policy 1992* (Government of Western Australia 1992b) and the EPA's review of the Peel Inlet and Harvey Estuary System Management Strategy (EPA 2003e)
- **Swan and Canning Rivers catchment** – *Environmental Protection (Swan and Canning Rivers) Policy 1998* (Government of Western Australia 1998c), and *Riverplan: An Environmental Management Framework for the Swan and Canning Rivers* (Government of Western Australia 2004c).

B7.3 CONSIDERING LAND DEGRADATION DURING PLANNING

The EPA strongly supports planning initiatives that address land degradation issues. Participants in land use planning processes are urged to become familiar with land degradation issues, to have a working knowledge of the causes of problems and the strategies for addressing problems, and to use land use planning mechanisms to assist in achieving environmental objectives and complement natural resource management initiatives.

Clear policy direction for the consideration of land degradation issues in planning is set out in the State Planning Strategy (WAPC 1997), State Planning Policy No. 2 *Environment and Natural Resources Policy* (Government of Western Australia 2003b) and State Planning Policy No. 2.5 *Agriculture and Land Use Planning* (Government of Western Australia 2002b).

Some key government strategies and initiatives that provide overarching guidance on managing land degradation issues are listed in A1.3.1 and Table B1. Agencies and organisations that have advisory, regulatory and management roles and may provide assistance to planning are listed in Table B1. A detailed discussion of some planning mechanisms used by planning agencies to address land degradation and the protection of natural resources is contained in *Managing Land Degradation Using Land Use Planning Processes: Training Resources Manual* (Agriculture Western Australia 1999).

The consideration of issues by planning agencies is helped by the acquisition of local area information on the topics listed in Attachment A1-1.

B7.3.1 BROAD SCALE PLANNING

The EPA suggests that the following procedures and considerations are taken into account during strategic planning and the preparation of planning schemes.

- Identify land degradation issues for the study area, having regard for government policies and guidelines, and current regional natural resource management strategies, plans and reports, for example, salinity management reports.
- Obtain information sufficient for planning purposes on each land degradation issue. Degraded areas and areas at high risk of degradation are best identified early in the planning process, so that inappropriate use and development can be avoided in these areas. Key information includes: areas at risk of degradation (directly and indirectly); local causes (threats) and characteristics of land degradation; environmental values that may be adversely affected; objectives, priorities and criteria in natural resource management plans and government policies; and how degradation can be managed (best practice). The limitations of the information on which planning is based should be clearly noted. Processes may need to be put in place to ensure detailed site-specific information is supplied at subsequent stages of planning.
- Closely consult with the community, stakeholders and relevant agencies.
- Consider the likely environmental impacts from existing land uses and proposed land use options, and compare against recognised environmental objectives and criteria (for example, those in current regional natural resource management strategies). Modelling of impacts may be appropriate to ascertain whether environmental objectives and criteria can

be met. Where information is not available, or local environmental objectives and criteria have not been developed, a precautionary approach to development should be taken.

- Where land degradation is an issue (or a potential issue), identify planning mechanisms that can be used to protect land and soil resources.
- Depending on the circumstances, consider the following mechanisms:
 - Outline objectives and actions to address land degradation in a local planning strategy.
 - Include planning objectives in schemes and strategies that address the protection of land and water resources/ecologically sustainable development/prevention of land degradation.
 - Develop planning policies that outline objectives, criteria, matters to be taken into account and information required for particular categories of developments (for example, intensive agriculture) or environmental factors (for example, the protection of waterways) at each stage of planning.
 - Introduce scheme provisions. Special control area provisions are particularly useful where an issue overlaps zones and reserve boundaries, as may be the case for natural resource management issues such as salinity, flooding, waterways protection and groundwater protection.
 - Carefully consider the range of land uses and developments to be subject to approval or prohibited in 'at risk' areas (examples of land uses that may require special attention are intensive agriculture; some dams and drainage works; works that change contours including laser grading; and works near water bodies).
 - Consider planning initiatives that encourage solutions to environmental problems, for example, conservation lots.
- Locate new land use areas/zones having regard for (amongst other considerations) the capacity of the land for sustained use, and avoidance of off-site environmental impacts.
- Consider how the planning system can integrate with and complement natural resource management.

The WAPC *Guidance on the Format of Local Planning Strategies* (WAPC 2000a) contains an example of a strategy for agricultural land that embraces protection of land and soil and avoidance of degradation.

B7.3.2 LOCAL AREA PLANNING

It is recommended that detailed guidance for considering land degradation issues during local area planning (scheme amendments, detailed structure plans and planning applications), is set out in planning strategies, schemes and policies. In the absence of this guidance, the procedures in B7.3.1 may be applied, as appropriate.

Applicants and decision-making authorities are urged to ensure that:

- Adequate information is provided to demonstrate that recognised environmental objectives and standards can and will be met. Consider site-specific technical studies and modelling of impacts, as appropriate.
- The proposed location of a new use or development is conducive to long-term environmental sustainability.
- Design, site layout and management options are fully considered with a view to reducing the likelihood of adverse environmental impacts to as low as practicable.
- Degraded land is rehabilitated, and revegetation targets are met.
- Conditions on use and development are implemented and enforced.

For an application for use or development in an area at risk of degradation, it is recommended that the key elements of a land management plan are provided prior to formal decision-making, and made enforceable.

Planning authorities may require expert advice to assist decision-making and the enforcement of conditions. Sources of advice include government agencies and regional natural resource management groups. Protocols may be developed between agencies on the provision of advice. In some instances, reports by independent experts will assist.

Acid Sulfate Soils

Where there is a risk of disturbing acid sulfate soil, the EPA expects that the procedures outlined in WAPC Planning Bulletin No. 64 *Acid Sulfate Soils* (WAPC 2003b) will be followed. This bulletin sets out the information that should be provided and the procedures to follow, including seeking comments from DEC. Detailed guidance on site investigations and the preparation of acid sulfate soil management plans is provided in the DEC Acid Sulfate Soil Guidelines series. The current titles in this series are listed in E3 and are available on www.dec.wa.gov.au.

B7.3.3 MEASURES TO MANAGE LAND DEGRADATION

The following section outlines some measures to manage land degradation. Experience with particular issues should suggest additional measures.

Location

- Locate activities and new lot boundaries appropriately, for example:
- Locate tracks, firebreaks, buildings, drainage and effluent disposal systems, agricultural and other areas having regard for land suitability.
- Give high priority to the protection of native vegetation, wetlands, waterways and their buffers.
- Locate lot boundaries on cleared and stable land and have regard for the creation of environmentally sound land management units.

Site rehabilitation and protection

- Require revegetation on cleared sites. Native species of local provenance should be planted where possible. Aim for some plantings with a structure similar to that of the native vegetation. Areas that should be given priority include windbreaks, drainage lines, waterlogged areas, erosion prone areas, and areas high in catchments.
- Publications by the Department of Agriculture and WAPC have referred to a target figure of 20% cover of deep-rooted vegetation per land holding. The EPA is generally supportive of any revegetation requirements, but encourages a higher proportion of deep-rooted vegetation on cleared land holdings where possible.
- Require the protection of remnant bushland, revegetation areas, waterways, wetlands and their buffers. For example, fence and control stock access to these areas; construct reinforced stock crossings over drainage lines; consider conservation covenants and conservation lots.
- Require the repair of degraded land. For example, repair erosion gullies; repair stock-damaged portions of creeks and around dams; fence off degraded areas; revegetate sandy rises prone to wind erosion and around drainage lines; plant windbreaks to reduce wind erosion; encourage removal of neglected orchards and vineyards in proposed rural residential areas.
- Require appropriate water management through the implementation of specified actions or an approved management plan, on advice of relevant agencies and experts.

Environmental or land management plans

Require the preparation and implementation of environmental/land management plans. Consider plans that address the following: effluent management, water management (how water is collected, distributed, re-used, disposed of), native vegetation management, stock management, overall farm management, fertiliser and pesticide application, fire management, weed management, and land rehabilitation.

For agricultural projects, consider a whole-of-farm environmental management system consistent with the AS/NZS ISO 14000 series. A guidebook to assist farmers develop an environmental management system has been published by the Department of Agriculture. Natural resource management groups may know of good local examples. Environmental management guidelines for specific agricultural activities are listed in E5.

Where possible, require monitoring of environmental impacts and periodic review and updating of management plans to promptly incorporate new techniques and information.

Land use controls

Consider controlling land uses, activities and stocking rates in zones or special control areas through scheme provisions or development conditions as appropriate, on advice of relevant agencies and experts.

B7.4 REFERRAL TO THE EPA

Generic advice on how and when to refer a scheme or a proposal to the EPA is provided in A3.2.1 and A4.2.1. The information below complements that advice.

The EPA generally expects that the mechanisms and agencies that have been set up to deal with land management, including planning, will duly manage land degradation issues.

However, in some instances, especially where there are significant agency concerns about the likely environmental impacts (direct, indirect and/or cumulative) of new land uses and developments, and the ability of decision-making authorities to manage these, a referred scheme or proposal may be subject to formal environmental impact assessment.

B7.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

With respect to the environmental factor of land degradation, referral of a proposal to the EPA pursuant to s38 *Environmental Protection Act 1986* (EP Act) should be considered if:

- there is a likelihood that an area of high conservation significance, as listed in Chapter B1, will be significantly affected
- the proposal is likely to contribute to significant land or water degradation.

Recommended pre-referral steps for decision-making authorities and a checklist of indicators for the referral of proposals to the EPA are in Figure A4 and Attachment A4-1.

B7.4.2 INFORMATION TO ACCOMPANY A REFERRAL

Basic helpful information to accompany the referral of a scheme or proposal to the EPA when land degradation is likely to be a key factor, includes:

- an aerial photo with the scheme or proposal area and key components of development and land use superimposed
- details of the potential on-site and off-site environmental impacts
- information on the site and its setting, for example, contours, land qualities, location of remnant vegetation, wetlands and waterways
- detailed site layout, and management measures proposed to avoid potential on-site and off-site impacts,
- and to rectify existing land degradation
- other approvals that may be required (for example, water license)
- comments and written advice from relevant government agencies, for example, the Department of Environment and Conservation and the Department of Agriculture in accordance with any agreed protocols
- reference to any site-specific environmental investigations that have been carried out, or are proposed, and any relevant regional catchment or natural resource management reports.

This is an indicative list and in some instances the EPA may request additional information. Where further information is required and where possible, please provide all relevant data in digital and GIS format.

Chapter B8

Landscape and landforms

B8.1 SIGNIFICANCE OF LANDSCAPE AND LANDFORMS

The advice in this chapter applies to natural areas, urban and developed areas with (or near) important natural features, rural farming areas and other areas where landscape values depend on natural resources.

The protection of natural and human-modified landscapes and landforms is important as they influence human wellbeing and visual amenity, and reflect environmental health and essential ecosystem processes.

Natural landscapes and human-modified landscapes that display a special integrity or character have long been considered worthy of protection. The importance of the protection of key landscapes and landforms for the present and future generations is reflected in a range of statutory and non- statutory protection measures. These include National Parks and heritage legislation; community action including National Trust activities; government policies, for example, the Leeuwin–Naturaliste Ridge State Planning Policy (Government of Western Australia 1998e); and the development of regional, national and international lists, for example, the Register of the National Estate.

Communities also expect natural and human-modified areas to maintain a particular level of landscape amenity, and are concerned about landscape changes that reflect environmental degradation, loss of biodiversity and unsustainable land management practices.

Landscape values can be affected by poor air quality, for example, haze and dust. The protection of air quality is addressed in Chapter C2.

Advice specifically on the protection of visual amenity is in Chapter D3.

B8.1.1 LAND USE PLANNING AND LANDSCAPE AND LANDFORMS ISSUES

There is an expectation that the protection of landscape quality and features will be considered during land use planning processes. To do this it is necessary for planners and proponents to identify the key values and issues related to landscapes and landforms.

TERMS

The concept of **landscape** is described in *Guidelines for Landscape and Visual Impact Assessment* (Institute of Environmental Assessment et al. 1995) as follows:

... Landscape commonly refers to the appearance of the land, including its shape, texture and colours. It also reflects the way in which these various components combine to create specific patterns and pictures that are distinctive to particular localities. It is not purely a visual phenomenon; it relies heavily on other influences for its character. These include the underlying geology and soils, the topography, archaeology, landscape history, land use, land management, ecology, architecture and cultural associations, all of which can influence the ways in which landscape is experienced and valued.

Landforms are an integral component of landscape. They combine slope and elevation to produce the shape and form of the land surface. Landforms reflect geomorphological processes and reveal the earth's history and functioning. As part of an ecosystem, a landform supports particular ecological communities, biota and ecosystem processes.

Checklist of landscape and landforms values

Environmental values associated with particular landscapes and landforms include:

- ecological values (landscapes reflect environmental health and represent ecological systems)
- geological and geomorphological values
- aesthetic values
- recreation opportunities
- economic and tourism opportunities
- social opportunities
- sense of place and spiritual experience
- heritage values
- opportunity for informal and formal study of natural and human modified environments
- opportunity to gain scientific knowledge and understanding of natural processes, including evolutionary processes.

Examples of issues of relevance to landscape and landforms and the land use planning process are briefly outlined below.

- The well-being of the community may be directly or indirectly affected by changes to landscapes, such as:
 - diminution in the extent and the quality of natural and other valued landscapes
 - loss of, or change to, key landscape and landforms elements
 - an accelerating rate of change in the landscape
 - change from a landscape dominated by natural elements to one dominated by built features.
- Landforms and landscape changes may be of concern not only because they affect the quality of life for the present generation, but also because the changes affect what will be available to future generations.
- Many of Western Australia's most serious environmental issues also lead to changes to the landscape, and adversely affect the community's relationship with the landscape and the quality of life linked to the particular landscape. These issues include loss of native vegetation, salinisation, erosion, eutrophication, land and water contamination, sedimentation, soil acidification, waterlogging and air pollution in the form of haze and dust.
- Change to, or loss of, landforms and landscapes of limited distribution or unusual features may restrict the opportunity to study and understand natural processes.

B8.2 EPA'S BROAD PRINCIPLES FOR THE PROTECTION OF LANDSCAPE AND LANDFORMS

EPA's objective

The EPA's objective for landscape and landforms is to maintain their integrity, ecological functions and environmental values.

The Environmental Protection Authority (EPA) urges that landscapes and landforms are managed to protect their environmental values through the integrated efforts of the community, proponents, government agencies, land managers, organisations and stakeholder groups.

The EPA recommends that:

- natural and human-modified landscapes and landforms important to the community and for maintaining key ecosystem processes and diversity are identified and managed using an integrated ecosystem management or natural resource management (NRM) approach. The NRM framework recommended by the EPA (EPA 2004b) involves consultative processes

that establish the environmental values to be protected, issues and threats, priorities for action, environmental objectives and criteria, an implementation strategy, monitoring and reporting, and performance review and improvement.

- landscapes and landforms of high conservation significance (B8.2.1) are fully protected, and other valued landscapes and landforms are also protected commensurate with the significance of the landscape or the landform (B8.2.2)
- landscape health is protected through informed decision-making that fully recognises the principles of ecologically sustainable development, in particular, the key principles pertaining to the management of ecosystems, biodiversity protection, intergenerational equity and the precautionary principle
- land use, development areas, infrastructure and individual constructions are carefully sited and designed to complement natural settings and processes
- degraded land and natural resources are rehabilitated where possible.

B8.2.1 LANDSCAPES AND LANDFORMS OF HIGH CONSERVATION SIGNIFICANCE

The EPA considers that landscapes and landforms in the areas below are of high significance and must be given a high level of protection in Western Australia:

- the public conservation reserve system: national parks, conservation parks, nature reserves, regional parks, marine parks, marine nature reserves and marine management areas, and land acquired and managed for such purpose pending formal reservation
- areas recommended for protection in the Conservation Through Reserves Committee's Systems 'Red Book' reports (Department of Conservation and Environment 1976–1983) except where superseded by later conservation recommendations endorsed by government
- regionally significant natural areas in Perth's Bush Forever (Government of Western Australia 2000b and updated list of Bush Forever sites), and in Regional Open Space Reserves in the Greater Bunbury Region Scheme and the Peel Region Scheme
- areas recommended by the Department of Environment and Conservation (DEC), and endorsed by government, for inclusion in the conservation estate
- natural areas on formally recognised national, international and regional heritage lists, for example, World Heritage property, Register of the National Estate, Biosphere reserves under the UNESCO Man and Biosphere program, Ramsar wetlands and Directory of Important Wetlands in Australia (Environment Australia 2001b)
- Conservation category wetlands and their buffers
- 'wild rivers', as identified by the Australian Heritage Council and the Department of Environment and Conservation (DEC), and their buffers
- natural areas of significant scientific, heritage or other interest as identified in any other scientific study or recommended by any formally recognised process or authority, subject to acceptance by the EPA.

The EPA expects that adequate areas representing the natural landscapes, landforms and geomorphological processes within each region of the state will be protected. The best examples of each type are likely to be of high conservation significance and require a high level of protection.

The EPA is unlikely to recommend the approval of projects that have significant adverse impacts on landscapes and landforms of high conservation significance except in special circumstances.

Where special circumstances for development exist, the EPA recommends that the procedures for mitigating adverse impacts are followed as set out in Position Statement No. 9 (EPA 2006). Any disturbance should be unobtrusive and not diminish the landscape, and maintain the other environmental values of the conservation area. Alternatives that minimise disturbance to the landscape will need to be considered.

Any development and land use near areas of high conservation significance should be located, designed and managed to be in harmony with the landscape character of the conservation area.

B8.2.2 OTHER IMPORTANT LANDSCAPES AND LANDFORMS

Areas with valued landscapes due to natural features or processes, for example, coastal areas, ridgelines, riverscapes and scarps

The EPA recommends that any development in or near these areas be carefully planned to protect key landscape values. Planning should incorporate:

- a vision for the planning area that reflects the natural values of the area and promotes 'a sense of place'
- the retention of characteristic landscape elements, including natural landforms and vegetation, especially in visually prominent places such as high dunes, together with areas important for maintaining key ecological values and functions
- the retention of representative areas of all natural landscapes and landforms, to maintain the natural character of the area.

Representative and rare landforms

In all regions, in addition to the protection of landscapes and landforms of highest conservation significance, the EPA urges that areas of all landforms, and particularly landforms of unusual or special character are retained, commensurate with the significance of the landform.

Agricultural land, rangelands and areas of natural resource utilisation

Some landscapes are in decline due to the pressures on the land, water and biodiversity resources from human use. The EPA stresses the need for sustainable management of the state's natural resources and encourages the development and implementation of management plans based on the environmental management system framework (AS/NZS ISO 14004:2004). The EPA's principles for the protection of the rangelands in Western Australia are in EPA (2004e).

B8.3 CONSIDERING LANDSCAPE AND LANDFORMS DURING PLANNING

The EPA expects that the protection of the environmental values of landscapes and landforms will be taken into account where planning processes allow.

Policy

Overarching guidance applicable to planning and landscape issues has been prepared by the Western Australian Planning Commission (WAPC) and includes State Planning Policy (SPP) No. 2 *Environment and Natural Resources Policy* (Government of Western Australia 2003b). This SPP requires that planning strategies, schemes and decision-making should identify and safeguard landscapes with high geological, geomorphological or ecological values, as well as those of aesthetic, cultural or historical value. The *Planning and Development Act 2005* allows for the classification or zoning of a scheme area for a range of purposes that include areas 'for protection of the environment or landscape'. SPPs that address landscape issues include State Planning Policy No. 6.1 *Leeuwin-Naturaliste Ridge Policy* (Government of Western Australia 1998e), State Planning Policy No. 2.6 *State Coastal Planning Policy* (Government of Western Australia 2003f) and State Planning Policy *Swan-Canning River System No. 2.10* (Government of Western Australia 2006).

Information, evaluation and management

A key to achieving an acceptable environmental outcome at each level of planning is adequate information and evaluation. Where impacts on landscape and landforms are likely to be an important issue, advice on appropriate studies and evaluation methodologies is available from government agencies, recognised experts and publications.

The Department for Planning and Infrastructure (DPI) and DEC have particular expertise in landscape planning and management. DPI is developing landscape planning guidelines which incorporate visual landscape assessment methods and guidance on landscape protection for certain land uses and landscape types, for example, wind farms, plantations, coastal landscapes.

To assist the protection of the visual landscape values of the DEC managed estate, the former Department of Conservation and Land Management developed the Visual Landscape Management System in the 1980s and 1990s. At the time of publication of this guidance statement, this system was being reviewed.

Methodologies for the evaluation and management of landscapes need to be tailored to the circumstances having regard for the type and significance of the landscapes that may be impacted, current land uses, the scale of planning (whether for a region or for a specific site) and the likely scale of visual impacts.

In the case of development that is likely to impact on a landscape that includes DEC estate, it is recommended that the methodology is developed in consultation with DEC.

Should a proposal or scheme be subject to the formal environmental impact assessment process, the methodology may also need to be agreed with the EPA.

The EPA supports the application of a methodology that includes the overarching environmental management system or natural resource management framework principles (AS/NZS ISO 14004:2004, EPA 2004b), to include consideration of landscape and landforms issues, as appropriate.

B8.3.1 BROAD SCALE PLANNING

The EPA observes that landscape and landforms protection issues can be more effectively managed when recognised at the earliest strategic planning and scheme formulation stages. At these broad scale levels of planning, it is recommended that landscape and landforms issues and places of significance within the region are identified through a consultative process with the community and stakeholders which includes outlining the planning and other procedures that will be utilised to protect landscape and landforms.

In the case of potential incremental development pressures on land in or near areas of high conservation significance (see B8.2.1) and other valued landscapes (B8.2.2), it is important that the larger region is the subject of a thorough strategic planning exercise that examines appropriate land use and development in the area. It is crucial to avoid adverse impacts on areas of high conservation significance. In and near other areas with valued landscapes (for example, the coastal area), key issues to be resolved as early as possible are: 'How much development is appropriate?' and 'Where can it occur?'

Broad scale planning should also address the role of planning in protecting and managing rural and agricultural landscapes (see B8.2.2). This process may be assisted by a regional natural resource management strategy.

For the EPA's generic advice on considering environmental issues during broad scale planning, the reader should refer to A1.4.1.

B8.3.2 LOCAL AREA PLANNING

Where development or land use change is proposed and protection of landscape and landforms is a relevant issue, the EPA suggests the application of the following checklist at the detailed structure planning, rezoning, subdivision and development stages. Planning and other authorities will also have particular requirements and processes to be complied with. Fulfilling the procedures below does not imply that a project will meet all approval requirements. Further, if the EPA assesses a proposal or scheme, the EPA may have more specific requirements than those covered in the checklist (see over).

CHECKLIST FOR CONSIDERING LANDSCAPE AND LANDFORMS DURING LOCAL AREA PLANNING

- ☐ Consider any guidance and principles that have been developed for the broader region.
- ☐ Carry out studies to describe and evaluate the existing landscape, landforms and visual resource, to enable authorities and proponents to make informed decisions on projects that may have impacts on valued landscapes and landforms, and to develop planning objectives. It may be desirable to carry out studies in accordance with a landscape and visual resource assessment methodology as agreed by all the relevant parties, for example, DPI and DEC. If a regional strategy has not adequately addressed landscape and landforms issues, some regional analysis may be necessary to provide context for the proposal or scheme amendment.
- ☐ Describe the potential impacts that a proposed development or land use may have with respect to landscapes and landforms and their associated values; the impacts that landscape changes may have on all stakeholder groups; and the magnitude and the significance of the impacts. The cumulative effects of impacts may be a relevant consideration.
- ☐ Consult with stakeholders, relevant agencies and the community, and show how consultation has been incorporated into the project.
- ☐ Employ sound design principles, and propose management measures that mitigate as far as possible the potential adverse impacts of the development on the landscape. Employ strategies of avoidance, minimisation, rectification, reduction and offsets. Management measures may need to include monitoring of landscape and visual impacts, and management responses where trigger criteria are exceeded. Management measures may need to address each stage of the development including design, construction, operation and, in some cases, decommissioning.
- ☐ Consider whether the location, design and management measures proposed for a specific land use or development are consistent with landscape and landforms protection objectives, and whether improvements could be made. Pursue these where possible.
- ☐ At the stage when a decision is to be made on a rezoning, land use or development, authorities should consider whether the setting of conditions or scheme provisions may enhance the outcome. For example, conditions could address:
 - ☐ development exclusion areas
 - ☐ compliance with specific design criteria (for example, use of local materials)
 - ☐ rehabilitation of degraded land
 - ☐ landscaping and revegetation, to meet specified completion criteria
 - ☐ the preparation and implementation of an environmental management plan. Key elements of an environmental management plan are outlined in Attachment A1-2.
- ☐ Ensure implementation of approved design and management measures.

B8.4 REFERRAL TO THE EPA

Advice on how and when to refer a scheme or a proposal to the EPA is provided in A3.2.1 and A4.2.1. The information below complements that advice.

Environmental assessment of a scheme or proposal is rarely required by the EPA solely on the basis of an impact on a landform or the appearance of the land. However, the EPA may examine these issues when comprehensive formal environmental impact assessment is required. For instance, landscape and landforms issues may be examined where the proposal site or scheme area:

- is a part of the overall landscape associated with an area of high conservation significance
- is in an area of general environmental significance such as the coastal area
- contains or is near a landscape or natural feature that is of high public interest.

B8.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

Referral of a proposal to the EPA under s38 Environmental Protection Act 1986 (EP Act) should be considered if the proposal is likely to have a significant impact on a landscape or a landform of high conservation significance as outlined in section B8.2.1, or if for any other reason a significant impact on the environment is likely.

A comprehensive checklist of indicators for the referral of a subdivision or development application to the EPA is in Attachment A4-1.

In the case of a proposal likely to impact on a landscape or a landform of high conservation significance, referral is not usually expected where:

- the proposal is consistent with a management plan that has gone through a comprehensive accredited approval process
- the environmental impacts can be managed through approval processes in a way that is acceptable to key advisory and regulatory agencies, and meet recognised environmental objectives and criteria.

B8.4.2 INFORMATION TO ACCOMPANY A REFERRAL

Where a scheme or proposal is referred to the EPA and the landscape or the landform can potentially be treated as key environmental factors and influence the level of assessment, it is helpful if the referrer provides information to the EPA. Information that may assist the EPA to set an appropriate level of assessment includes:

- a description of the landscape and landforms (supported by aerial and other photographs where practicable), information on the environmental significance of the locality, and the potential impacts of the proposed development on the landscape and landforms
- the results of any consultation carried out with authorities, organisations and the public
- information on the extent of any landscape and visual amenity studies carried out or proposed
- the design and management of the intended development (indicating how potential impacts on the landscape and landforms will be avoided or minimised).

As particular circumstances may vary considerably, the guidance in this section is indicative only. In the case of specific referred proposals or schemes, the EPA may request different or additional information to assist in setting the level of assessment. Where further information is required and where possible, please provide all relevant data in digital and GIS format.

Chapter B9

Karst, subterranean wetlands and fauna

B9.1 SIGNIFICANCE OF KARST, SUBTERRANEAN WETLANDS AND FAUNA

Areas within Western Australia which are karstic include the second largest contiguous karst in the world on the Nullarbor Plain, parts of the Kimberley, the Cape Range Province in the Exmouth area, parts of the Swan Coastal Plain (for example, the Wanneroo cave belt), parts of the Leeuwin–Naturaliste Ridge and extensive areas of groundwater calcrete in the arid zone.

Karst in Western Australia is generally in limestone and can be very variable in appearance and characteristics. It extends above and below ground with attributes that include enclosed surface depressions (dolines), caves, fissures, solution pipes, subterranean streams, subterranean fauna, and rare underground ecological communities such as the aquatic root mat communities in the Yanchep and Leeuwin–Naturaliste Ridge caves.

Subterranean fauna is a special feature of karst, however it is not confined to karst alone. Subterranean fauna can occur wherever subterranean voids occur, such as gravels, pisolites and fractured rock. This fauna may be broadly classified into **stygo fauna** (fauna living in groundwater) and **troglo fauna** (terrestrial fauna living underground in interstices, fissures and caves).

Karst areas are known to be particularly sensitive environments. Compared with many other landscapes they have a low capacity to cope with disturbance, and are difficult, if not impossible, to restore once degraded (Hamilton-Smith et al. 1998). Activities in the catchment may adversely affect karst due to the ease of transfer of materials in karst, for example, water and air (Watson et al. 1997).

Karstic environments are also complex. Protecting and managing them largely depends on understanding the dynamic and interrelated processes in the catchment that maintain the karst. These processes involve the interplay between rock, soil, water, climate, underground air, vegetation, fauna and time.

Experts on karst generally place a strong emphasis on protecting the quality and quantity of the surface water and groundwater that support the karst. In the case of groundwater, this generally requires a knowledge of the extent of the groundwater catchment and appropriate management of land uses within the catchment to prevent groundwater pollution and to maintain water levels within the natural range. Another important aspect is the protection of the underground microclimate. Soil compaction and artificial cave openings can have severe impacts on cave formations and subterranean ecological communities.

To date there has been limited research on karstic environments and the impacts of development on karst in Western Australia. This is partly due to the difficulties associated with studying below-ground attributes and processes.

The values of a particular area of karst will generally include some or all of the following:

- biological diversity, on the surface and underground
- maintenance of ecological processes
- habitat for rare and threatened flora, fauna and ecological communities
- protection of subterranean fauna
- maintenance of landforms and karstic features
- archaeological, geological and paleological resource
- social, cultural and economic values, for example, recreation, conservation, tourism, landscape and visual amenity, Aboriginal and European heritage, spiritual experience, scientific study, educational resource, water supply and mining.

TERMS

Karst is defined in Watson et al. (1997) as ‘a distinctive style of terrain that is characterised by individual landform types and landform assemblages that are largely the product of rock material having been dissolved by natural waters to a greater degree than in most landscapes’.

For planning purposes it is helpful to be aware of threats to the values of karst and the issues that may arise. An indicative checklist of potential threats and issues follows.

CHECKLIST FOR CONSIDERING LANDSCAPE AND LANDFORMS DURING LOCAL AREA PLANNING

Threats to the environmental values of karst include the following:

- ☐ clearing vegetation in the area of the karst and in the catchment that supplies surface and groundwater to the karst
- ☐ replacing native vegetation in the catchment with non-indigenous species
- ☐ soil compaction on the surface and in caves (may affect water percolation, carbon dioxide levels and the subterranean microclimate)
- ☐ disturbing or destroying landforms and karst features on the surface and in caves
- ☐ changes to water quality in the groundwater and surface water catchment of the karst, for example, increased nutrient loads and other pollutants due to agriculture, urban and other activities
- ☐ altering the watertable beyond natural variation in the groundwater catchment, for example, through extraction of water for irrigation or drinking water
- ☐ changes to surface drainage patterns, for example, roads, buildings and irrigation concentrate water and may contribute to rapid acceleration of cavity formation, subsidence and collapse
- ☐ modifying air movement or placing artificial light in caves, associated with recreational uses, tourism development or scientific study
- ☐ introducing non-indigenous flora, fauna or diseases that may affect the biodiversity of the karstic environment
- ☐ mine dewatering.

Some of the issues associated with karst areas in Western Australia include, but are not limited to:

- ☐ the protection of biodiversity
- ☐ the protection of rare subterranean fauna and ecological communities
- ☐ the maintenance of natural environment and ecological processes
- ☐ the protection of socially and culturally important sites and landscapes
- ☐ the availability of land for development, and urban and rural-residential development pressures
- ☐ the availability of, and demand for, potable and other water
- ☐ the availability of, and demand for, waste disposal sites
- ☐ the location of infrastructure such as roads
- ☐ tourism and recreation demands and pressures
- ☐ use for military purposes, for example, in the Cape Range and Lancelin areas
- ☐ quarrying of limestone
- ☐ public safety near unstable environmental features.

B9.2 EPA'S BROAD PRINCIPLES FOR THE PROTECTION OF KARST, SUBTERRANEAN WETLANDS AND FAUNA

EPA's objective

The EPA's objective for karst is to maintain its integrity, ecological functions and environmental values of karst.

The following principles summarise the position of the Environmental Protection Authority (EPA) on the protection of karst, subterranean wetlands and fauna.

Manage according to sound ecologically sustainable development principles

All karst in Western Australia requires appropriate management according to ecologically sustainable development and biodiversity protection principles (outlined in EPA 1999 Appendix 2).

Apply the natural resource management framework

The EPA urges that karstic environments are managed using an integrated ecosystem management or natural resource management (NRM) approach. The NRM framework recommended by the EPA involves consultative processes that establish environmental values, objectives and criteria/targets; management actions (management plan) and monitoring; and evaluation of environmental performance, as outlined in EPA 2005a.

Areas of highest conservation significance

Areas of karst that the EPA considers to be of highest conservation significance where a high level of environmental protection is appropriate are listed in B9.2.2.

Make informed decisions

Where development in the catchment of a karstic environment is proposed it is important that adequate research, site investigations, modelling and evaluation are first carried out to establish karstic attributes (above and below ground), the significance of the karstic environment and potential impacts, and mechanisms for protecting the values of the karst. This should involve experts such as speleologists, zoologists, botanists, hydrologists, hydrogeologists, geologists and karst management consultants.

A prerequisite for any development in the catchment of a karstic environment should be a demonstration that it can and will be managed to maintain the multiple environmental values of karst.

Decision-making and management processes for karstic environments should incorporate comprehensive consultation with government agencies, organisations including specialist speleological groups, the community and environmental experts.

Baseline environmental data should be established to enable identification of environmental changes.

To ensure the protection of karstic biodiversity and landforms, it is important to adequately understand and protect the surface water and ground water regime in the catchment of karst. Where development occurs in the catchment, an environmentally sustainable outcome is likely to depend on appropriate management responses to the monitoring of water quality and quantity.

Adopt best practice

Any development with the potential to impact on karst should follow best practice principles (EPA 2003b) with continuous improvement through an environmental management system. This should include ongoing research to foster knowledge of the area to enable better planning and management.

Take a precautionary approach

Where there is a lack of knowledge on the extent and characteristics of karst and its catchment, and the interactions and processes that sustain a specific karstic environment, a precautionary approach to development and land use is required.

B9.2.1 EPA'S PUBLISHED POSITION

EPA publications providing guidance specifically on aspects of karstic environments include:

Environmental Protection of Cape Range Province EPA Position Statement No. 1 (EPA 1999)

Consideration of Subterranean Fauna in Groundwater and Caves During Environmental Impact Assessment in Western Australia EPA Guidance Statement No. 54 (EPA 2003d).

B9.2.2 KARST AREAS OF HIGH CONSERVATION SIGNIFICANCE IN WESTERN AUSTRALIA

The EPA considers that karst in the areas listed below is of high conservation significance and must be fully protected in Western Australia. The EPA is unlikely to recommend the approval of projects that have significant adverse impacts on these areas except in special circumstances (EPA 2006).

Development should avoid direct, indirect and cumulative impacts on the following areas:

- areas vested for the purpose of the conservation of native flora and/or fauna, national park, conservation park or regional park, and land acquired and managed for such purpose pending formal reservation
- areas recommended by the Department of Environment and Conservation (DEC) and endorsed by government for inclusion in the conservation estate
- areas of the state recommended for protection in the EPA's Systems 'Red Book' reports (Department of Conservation and Environment 1976–1983) except where superseded by later conservation recommendations endorsed by government
- areas identified for the protection of regionally significant vegetation or natural areas through Perth's Bush Forever process, the Bunbury Region Scheme planning process and the Peel Region Scheme planning processes
- areas recommended by any other formally recognised process that designates land for the protection of the natural environment, for example, regional planning strategies as updated from time to time
- sites on formally recognised national, international and regional lists of significant natural areas, for example, World Heritage property, the Register of the National Estate, Ramsar wetlands, Directory of Important Wetlands in Australia and Biosphere reserves under the UNESCO Man and Biosphere program
- karstic areas with vegetation, flora, fauna and ecological communities of high conservation significance (see Chapters B2 and B3)
- karst identified as requiring a high level of protection, or of high significance, by an authority or expert on the subject or following any rigorous recognised process, subject to confirmation by the EPA.

Karst in Cape Range Province

A karstic environment of high conservation significance occurs in the Cape Range Province. This area is important to the people of Western Australia for its coral reef, its subterranean fauna of international significance, its landscape and biological diversity. The Province attracts a range of land uses and activities including tourism, recreation, fishing, defence, mining and grazing.

In view of the activities occurring in and near this significant environmental area, the EPA has published a set of principles with the objective of ensuring that development does not exceed the long-term ability of the area to accommodate human use pressures (EPA 1999).

The significance of the Cape Range Karst Province and key karst management issues are also addressed in a report prepared for the former Department of Environmental Protection entitled Karst Management Considerations for the Cape Range Karst Province, Western Australia (Hamilton-Smith et al. 1998).

B9.3 CONSIDERING KARST DURING PLANNING

A key to achieving an acceptable environmental outcome for karst at each level of planning is adequate environmental data.

In order to establish those areas where conservation is appropriate and those where some development may be acceptable, and appropriate land uses in the hydrological catchment, site survey work will often be necessary to supplement existing knowledge. A list of site survey techniques for determining the presence and extent of karst is available from the Western Australian Speleological Group (wasg.iinet.net.au).

Depending on the type of development pressures that exist, investigations should address the extent and nature of karst above and below ground, the extent of cavities, the surface and subterranean biodiversity, and the groundwater and surface water regime. Other relevant surveys could include landscape assessment and heritage studies. All values such as geological and paleological values should be considered.

To date, even the extent of karst has from time to time proved difficult to establish, generally being derived from ground-probing radar surveys and detailed drilling programs.

Where information is limited and development pressures exist, it may be useful to establish categories of karst areas, for instance, three or four categories from 'known karst areas' through 'high likelihood of karst' and 'low likelihood of karst' to known 'karst-free areas', and including, if relevant, 'upstream areas'. Different land use controls and approval processes may be appropriate to each category.

Sources of information and advice of relevance to land use planning in karstic catchments include the following government agencies, organisations and experts:

- DEC (threatened ecological communities, significant flora and fauna, progressing a comprehensive, representative and adequate system of reserves)
- Western Australian Museum (stygo fauna, fauna and artefacts)
- local and state government planning agencies
- Department of Indigenous Affairs (DIA)
- organisations and agencies that maintain natural area and heritage lists, for example, the World Heritage list, the Register for the National Estate, local heritage listings and National Trust lists
- EPA (assessment of projects that may have a significant effect on the environment)
- DEC (knowledge of surface and groundwater processes and ecological systems; responsibilities with respect to water allocation and pollution management)
- Department of Industry and Resources (DoIR) (approvals for mining activities)
- universities, speleological experts and groups (for example, the Western Australian Speleological Group, Speleological Research Group of Western Australia, Cavers Leeuwin, Australian Speleological Federation, Australasian Cave and Karst Management Association), geotechnical experts, environmental scientists.

Much expertise in karst systems lies with speleological groups. Consultation programs should ensure that people and groups with expertise are contacted and have sufficient time to provide input.

B9.3.1 BROAD SCALE PLANNING

The cumulative and indirect impacts of development on sensitive environments like karst can be more effectively managed when recognised at the earliest structure planning and scheme formulation stages. In areas where karstic values may be impacted, the EPA considers that the protection of karst is a key factor to address at the broad scale levels of planning. The EPA recommends that the following procedures and considerations are applied. This advice supplements the generic advice in A1.4.1 to ensure environmental protection is adequately addressed during broad scale planning.

- Identify any areas of karst in and near the study area, and the hydrological catchments of these areas. If existing information is being relied upon, and development pressures exist or are imminent, establish whether existing information is sufficiently detailed. Where information is limited, the strategic plan recommendations should take a precautionary approach and be dependent on the outcomes of further site investigations.

- Identify existing and potential future issues relating to karst and development in the catchment of karst. Examples of issues are in B9.1.
- Involve the community, relevant agencies, experts and stakeholders in planning processes and identification of the values, issues, environmental quality objectives and management measures for the karst. These may vary throughout the karstic area.
- Avoid land use categories that may adversely affect karst, having regard for environmental quality objectives for each specific area of karst. It is expected that areas of high conservation significance will be fully protected (see B9.2.2). Avoid locating development where there is a danger of subsidence or collapse, or where development may trigger collapse.
- In the water catchment of the karst, ascertain whether and how the groundwater and surface water regime can be managed to maintain the precise water regime which supports the karst.
- In areas where some development of karst may be consistent with overall environmental objectives, outline the procedures to be carried out prior to the granting of any approvals. Procedures may include site investigations that establish the extent and characteristics of the karst, its biodiversity, water regime and other attributes, and the preparation of management plans. Different land use controls and approval processes may be appropriate depending on the significance of the particular karstic area.

B9.3.2 LOCAL AREA PLANNING

The following procedures and considerations will assist in achieving the EPA's objectives where a rezoning, subdivision or development is proposed in a catchment that supports karst. Development of areas 'upstream' of karst come into this category. In some cases it will not be appropriate for individual rezonings or developments to proceed in the absence of the prior strategic consideration of the protection of karst in the locality.

Identify regional and local issues, strategic and local policies, catchment and natural resource management data and reporting, and other existing data relevant to karst in and near the planning site.

Where there may be development pressures on karst or its catchment, be aware of areas of karst, karstic attributes, values and the significance of the karst, its catchment, and the level of knowledge about the local karst.

- Identify the levels of protection to be applied within the karstic area, taking a precautionary approach where knowledge is incomplete.
- Where there may be development pressures on karst or its catchment, identify the potential impacts on the karst (direct, indirect and cumulative), for example, clearing of native vegetation, increase in population causing recreational pressures and damage over time, increased levels of nutrients and other pollutants in surface water or groundwater. Assess whether management mechanisms can effectively address each of the potential impacts.
- Check whether sufficient site investigations have been carried out to allow an informed planning decision to be made, for example, investigations of the extent and nature of the karst, ground stability, the surface and subterranean biodiversity, and the groundwater regime.
- It is preferable to avoid disturbance of karst. Areas of high conservation significance should be fully protected, and there should be no development where there is a risk of land subsidence or collapse.
- Where some disturbance is proposed, demonstrate that alternatives have been fully considered and the selected option is not inferior to another option having lower impact on karst.
- At rezoning, consider setting out the information requirements to be met and the detailed procedures that will need to be followed before a subdivision or development application may be approved.
- Ensure an appropriate level of involvement from the community, relevant agencies, experts and stakeholders. Speleological groups (see B9.3) should be contacted for advice.

- Prior to considering some types of applications, the preparation and implementation of a regional or sub-regional water management plan or integrated catchment management plan may be desirable.
- Implement a range of management conditions and mechanisms. Examples of measures to protect karst are listed opposite.

CHECKLIST OF MEASURES TO PROTECT KARST

- ☐ Protect vegetation and soil above karst.
- ☐ Protect vegetation and prevent land degradation in the hydrological catchment.
- ☐ Protect water quality and water quantity in the hydrological catchment of the karst. Depending on the scale of development the following may be appropriate:
 - ☐ control of land uses via mechanisms such as apply to public drinking water sources (see Chapter B6)
 - ☐ preparation and implementation of a water management plan
 - ☐ control of groundwater abstraction
 - ☐ implementation of water sensitive urban design principles
 - ☐ sewerage
 - ☐ minimum application of fertilisers
 - ☐ controls on stock keeping
 - ☐ monitoring of the water regimes that support karst
 - ☐ contingency plans to be implemented where monitoring trigger levels are reached.
- ☐ Prepare and implement a regional, sub-regional or development-specific karst management plan addressing, for example, the protection of vegetation, soils, fauna, caves and landscape, stormwater management, fire management and public safety. Standard elements of a management plan are outlined in Attachment A1-2.
- ☐ Prepare and implement a subterranean fauna management plan on advice of DEC and scientific experts.
- ☐ Require geotechnical and environmental investigations in karstic areas proposed for building envelopes where there is a risk of land subsidence and collapse.

B9.4 REFERRAL TO THE EPA

Advice on how and when to refer a scheme or a proposal to the EPA is provided in A3.2.1 and A4.2.1. The information below complements that advice.

With respect to the biophysical factor 'karst', there is the possibility that a scheme or proposal referred to the EPA will be subject to the formal environmental impact assessment process, or found unlikely to be environmentally acceptable if:

- direct or indirect impacts on karst of high significance as listed in B9.2.2 are likely
- there is insufficient information to establish the significance of the karst, and impacts on an area that is likely to contain karst are proposed
- the EPA is not satisfied with the management arrangements for the area, or
- for any other reason the EPA considers that there is a likelihood of a significant impact on the environment.

B9.4.1 TRIGGERS FOR THE REFERRAL OF A PROPOSAL TO THE EPA

Referral of a proposal to the EPA pursuant to s38 Environmental Protection Act 1986 (EP Act) should be considered if karstic areas of high conservation significance (see B9.2.2) are likely to be adversely affected.

Attachment A4-1 also provides a checklist of indicators for the referral of subdivision and development proposals to the EPA.

Prior to any referral on the basis of impacts on karst, the EPA expects that DEC and other relevant agencies and experts such as the Museum of Western Australia, the University of Western Australia and speleological groups will be consulted. The EPA expects decision-making authorities and proponents to use their best endeavours to protect areas of karst, through appropriate design (including the reservation of land where appropriate), management actions and conditions of approval, after obtaining adequate information and consulting with relevant stakeholders and agencies. Where it is unlikely the proposal will be adequately managed through the planning process, having regard for the advice from relevant agencies and experts, referral of the proposal to the EPA is generally indicated. Referral may not be required if the proposal is consistent with a strategic plan that the EPA has found to be acceptable.

B9.4.2 INFORMATION TO ACCOMPANY A REFERRAL

As referrals that have an impact on karst face the possibility of a formal assessment, the proponent or responsible authority may wish to discuss referral information requirements with the EPA Service Unit before making a referral. In instances where the proponent or responsible authority may wish to demonstrate that there will be no significant impacts on karst, or that the karst is not of high conservation value, the following information would assist:

- a map indicating the location of the proposal in relation to known areas of karst.
- an aerial photo over which the proposal or scheme area has been superimposed, and photos of the subject land.
- potential environment impacts arising from the proposal or scheme, and their significance.
- information on any investigations carried out, and proposed to be carried out, on the area of karst or suspected karst and the groundwater regime and catchment.
- the results of any consultation carried out, and consultation proposed.
- the management measures proposed to mitigate the potential impacts, and details of how these will be addressed in the scheme, or could be addressed through conditions on subdivision or development.
- evidence of consultation with appropriate experts, for example, the committee of a recognised speleological group which is a member of the Australian Speleological Federation.

This is an indicative list and in some instances the EPA may request additional information. Where further information is required and where possible, please provide all relevant data in digital and GIS format.



**Environmental
Protection Authority**

Environmental Guidance for Planning and Development

Part C

Pollution Management

Part C

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Overview

Pollution management

Part C of this guidance statement provides the advice of the Environmental Protection Authority (EPA) on the following pollution management factors to assist **decision-making authorities** and participants in land use planning to protect the environment.

- Pollution management – Chapter C1
- Air quality – Chapter C2
- Water management – Chapter C3
 - total water cycle management
 - stormwater management
 - point source pollution
 - on-site effluent management
- Noise and vibration – Chapter C4
- Light, radiation and electromagnetic fields – Chapter C5
- Contaminated sites – Chapter C6
- Waste management – Chapter C7.

Chapter C1 provides overview advice for land use planning and development projects likely to raise pollution management issues, and includes advice on providing buffers around land uses associated with off-site emissions.

Chapters C2 to C7 provide advice on each pollution management factor on the following topics:

Background: background information on the factor including important issues.

EPA's broad principles for the protection of the factor: the EPA's objective for the factor, the key principles that the EPA applies to the factor, and the EPA's published position.

Considering the factor during planning: advice to assist land use planning and development at the broad scale (strategic and structure planning, regional schemes, town planning schemes) and at the local level (subdivisions, developments, detailed local structure plans and town planning scheme requirements).

Referral to the EPA: advice on referring a scheme or proposal to the EPA, and information that assists the EPA to set the level of assessment.

Attachments: supplementary information at the end of some chapters.

POLICY AND REGULATORY OVERVIEW FOR POLLUTION MANAGEMENT FACTORS

Table C1 below outlines key agencies, policies, strategies and some specific statutory requirements in relation to the pollution management factors discussed in this Guidance Statement, to assist the integration of environmental protection and land use planning in Western Australia.

For more general information, see the following sections:

introductory information on agency roles and relevant legislation – Table A1

overarching environmental strategies and policies, for example, *The Western Australian State Sustainability Strategy* – section A1.2.1

publications of the EPA, Department of Environment and Conservation (DEC) and other agencies – Part E

references for State planning policy – State planning policies are listed in the Government of Western Australia references in E1, except for draft state planning policy, which are in the Western Australian Planning Commission references.

Table C1. Pollution management factors: Key agencies, policies, strategies and initiatives

POLLUTION MANAGEMENT FACTORS DISCUSSED IN THIS GUIDANCE STATEMENT	AGENCIES ¹	GOVERNMENT POLICIES, DISCUSSION DOCUMENTS, STRATEGIES, CRITERIA AND INITIATIVES RELEVANT TO POLLUTION MANAGEMENT FACTORS
Air quality (Chapter C2)	<p>DEC EPA Department of Health State government planning agencies Local government (land use planning, environmental health, transport planning) Infrastructure providers Department of Industry and Resources Department of Agriculture Western Australia</p>	<p>National Environment Protection (Ambient Air Quality) Measure (this sets air quality standards for the following major air pollutants – carbon monoxide, nitrogen dioxide, photochemical oxidants, sulfur dioxide, lead and particles) National Environment Protection (Air Toxics) Measure <i>Perth Air Quality Management Plan</i> (DEP 2000a) <i>Western Australian Greenhouse Strategy</i> (Western Australian Greenhouse Task Force 2004) Local Agenda 21 The Cities for Climate Change program TravelSmart</p> <p>Environmental Protection (Goldfields Residential Areas) (Sulfur Dioxide) Policy 2003 and associated Regulations Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999 and associated Regulations</p> <p>State Planning Policy No. 2 Environment and Natural Resources Policy State Planning Policy No. 4.1 State Industrial Buffer Policy Draft State Planning Policy No. 4.1 State Industrial Buffer Policy State Planning Policy No. 4.3 Poultry Farms Policy</p>
Water management (Chapter C3)	<p>DoW EPA Planning agencies Local government Swan River Trust Health Department of Western Australia Service providers, for example, Water Corporation Department of Agriculture Western Australia Department of Fisheries Department of Industry and Resources Natural Resource Management Council</p>	<p>National Water Quality Management Strategy (introduced 1992) State Water Quality Management Strategy (introduced 2001) State Water Strategy (Government of Western Australia 2003d)</p> <p>Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 Environmental Protection (Gnangara Mound Crown Land) Policy 1992 Environmental Protection (Peel Inlet–Harvey Estuary) Policy 1992 Environmental Protection (South West Agricultural Zone Wetlands) Policy 1997 Environmental Protection (Swan and Canning Rivers) Policy 1997 State Planning Policy No. 2 Environment and Natural Resources Policy State Planning Policy No. 2.1 The Peel–Harvey Coastal Plain Catchment</p>

POLLUTION MANAGEMENT FACTORS DISCUSSED IN THIS GUIDANCE STATEMENT	AGENCIES ¹	GOVERNMENT POLICIES, DISCUSSION DOCUMENTS, STRATEGIES, CRITERIA AND INITIATIVES RELEVANT TO POLLUTION MANAGEMENT FACTORS
	Catchment and natural resource management groups	<p>Policy</p> <p>State Planning Policy No. 2.2 Gnangara Mound Crown Land Policy</p> <p>State Planning Policy No. 2.3 Jandakot Groundwater Protection Policy</p> <p>State Planning Policy No. 2.6 State Coastal Planning Policy</p> <p>State Planning Policy No. 2.7 Public Drinking Water Source Policy</p> <p>State Planning Policy No. 2.9 Water Resources</p> <p>State Planning Policy No. 2.10 Swan-Canning River System</p>
Noise and vibration (Chapter C4)	<p>Local government (administers the <i>Environmental Protection (Noise) Regulations 1997</i>)</p> <p>DEC</p> <p>EPA</p> <p>Planning agencies</p> <p>Department of Industry and Resources</p>	<p>State Planning Policy No. 2 Environment and Natural Resources Policy</p> <p>State Planning Policy No. 4.1 State Industrial Buffer Policy</p> <p>State Planning Policy No. 5.1 Land Use Planning in the Vicinity of Perth Airport</p> <p>Draft State Planning Policy Metropolitan Freight Network</p> <p>Draft State Planning Policy Road and Rail Transport Noise</p> <p>State Planning Policy No. 5.3 Jandakot Airport Vicinity</p>
Light, radiation and electromagnetic fields(Chapter C5)	<p>Department of Health</p> <p>Department of Industry and Resources</p> <p>Australian Radiation Protection and Nuclear Safety Agency</p> <p>Australian Communications Authority</p> <p>Western Power</p>	<p>State Planning Policy No. 4.1 State Industrial Buffer Policy</p>

POLLUTION MANAGEMENT FACTORS DISCUSSED IN THIS GUIDANCE STATEMENT	AGENCIES ¹	GOVERNMENT POLICIES, DISCUSSION DOCUMENTS, STRATEGIES, CRITERIA AND INITIATIVES RELEVANT TO POLLUTION MANAGEMENT FACTORS
Contaminated sites (Chapter C6)	DEC EPA Planning agencies Local government Infrastructure providers Department of Agriculture Western Australia	State Planning Policy No. 2 Environment and Natural Resources Policy
Waste management (Chapter C7)	DEC (see Table A1) DEC also: <ul style="list-style-type: none"> – administers the <i>Environmental Protection (Controlled Waste) Regulations 2001</i> – administers the Waste Management and Recycling Fund that assists strategic waste management industries – provides advice on waste management policy, including advice to the Waste Management Board. – contributes to the Green Stamp Program that assists specific industries/activities to reduce and manage waste Waste Management Board Department of Health EPA Department of Industry and Resources Local government State planning agencies	<p><i>Towards Zero Waste: WAste 2020 TaskForce Report and Recommendations</i> (Waste 2020 TaskForce 2001). This report proposes a vision 'towards zero waste by 2020', and recommends actions for the following sectors: construction and demolition, green and organic, municipal, controlled waste, commercial and industrial, packaging.</p> <p><i>Strategic Direction for Waste Management in Western Australia</i> (DEC & Waste Management Board 2003). This discussion paper builds on the Waste 2020 Taskforce recommendations.</p> <p>State Planning Policy No. 1 State Planning Framework Policy State Planning Policy No. 2 Environment and Natural Resources Policy</p>

1. See the Acronyms list at the beginning of this guidance statement.

Chapter C1

Pollution management

C1.1 BACKGROUND

Most land uses are associated with emissions, waste products or materials that require careful management to prevent adverse impacts on the environment and human amenity, safety and health. Typical emissions include gaseous and particulate emissions, dust, odour, wastewater, noise and light spill.

This chapter provides overview advice from the Environmental Protection Authority (EPA) for land use planning and development projects likely to raise pollution management issues. The subsequent chapters provide more detailed advice on particular pollution management factors.

It should be noted that the focus of the advice in this Guidance Statement is on protecting natural resources and conservation areas, and protecting the amenity, safety and health of people off-site. Advice is not provided regarding on-site amenity, safety and health as this is usually outside the role of the EPA and is addressed by other processes, for example, occupational health and safety.

TERMS

Pollution is defined in the *Environmental Protection Act 1986 (EP Act)* as direct or indirect alteration of the environment:

- to its detriment or degradation
- to the detriment of an environmental value, or
- of a prescribed kind, that involves an emission.

In this chapter, **buffer** means 'the area within which sensitive land uses are prohibited or special measures are necessary to ameliorate the impacts of industry or infrastructure' (WAPC 2004c).

A **sensitive land use** is a land use sensitive to **emissions** from industry and infrastructure. Examples include residential development, hospitals, hotels, motels, hostels, caravan parks, schools, aged care facilities, child care facilities, shopping centres, playgrounds, recreational centres, public buildings and Public Drinking Water Sources. Some commercial, institutional and industrial land uses which require high levels of amenity or are sensitive to particular emissions are also 'sensitive land uses'. Examples include some retail outlets, offices and training centres, and some types of storage and manufacturing (EPA 2004b).

C1.2 EPA's BROAD PRINCIPLES FOR POLLUTION MANAGEMENT

EPA's objectives

To ensure that land uses and activities that may emit or cause pollution are managed to maintain:

physical and biological environment and the natural processes that support life the health, welfare and amenity of people and land uses.

To ensure that pollutants emitted are as reasonably practicable, and comply with all statutory requirements and acceptable standards.

The EPA's hierarchy for the management of emissions from industry and **infrastructure** is, in order of preference:

- avoid emissions and wastes
- minimise emissions and waste by implementing **best practice** (EPA 2003b)
- contain emissions within the individual industry site boundary
- contain emissions within the industrial estate
- contain emissions within a buffer area
- demonstrate that there is no unacceptable impact on nearby sensitive land uses and the environment.

(Adapted from EPA 2005a)

The overarching environmental principles in s4A EP Act and EPA Position Statement No. 7 (EPA 2004a) are of key relevance to pollution management.

C1.3 CONSIDERING POLLUTION MANAGEMENT DURING PLANNING

Land use planning has a crucial role in pollution management. To help achieve outcomes consistent with the EPA's objectives, it is recommended that the following matters are considered at each stage of planning, as appropriate:

- the range of potential activities that emit pollutants, the likely pollutants and their impacts
- existing and projected levels of emissions
- the characteristics of the receiving environment, its values and significance
- the separation between land uses likely to emit pollutants and sensitive land use areas
- environmental principles, policies, objectives and criteria in relation to emissions and the receiving environment
- location of land use zones and individual developments (locate these where site conditions, for example, soil, topography, water table and local meteorological conditions, are suitable and are not likely to cause environmental management problems)
- site layout and building design
- technical processes that adopt environmental best practice measures and prevent or minimise emissions and wastes
- management systems that takes into account feedback from monitoring, incorporate contingency plans, and allow for continuous improvement to maintain emissions as low as reasonably practicable
- information (for example, technical modelling) that demonstrates that emissions from proposed land uses and activities are likely to be retained on-site or within an agreed buffer area (see C1.3.1) and meet environmental objectives and criteria
- integration with other agency processes (see Table C1), for example, licensing under Part V of the EP Act
- consultation with stakeholders, relevant agencies and the public
- condition setting and enforcement applicable to each stage of development, for example, the construction, operational and decommissioning stages.

To avoid land use conflicts between polluting activities and sensitive land uses, it is preferable that emissions are retained and managed to acceptable levels within the site boundaries.

An alternative that may be acceptable subject to careful planning and meeting all other relevant criteria and objectives, is to retain emissions within the same land use zone or estate. This may mean that industries that require a large buffer would need to locate well inside an industrial zone, while industries without off-site impacts could locate at the periphery of the industrial zone.

In the case of industries important to the community, where no other option is practicable, off-site buffers that extend into neighbouring zones or land use areas may need to be applied through planning mechanisms to prevent unacceptable pollution impacts on people and land uses. However, experience shows that this option generally is not well-received by some sectors of the community as it can inhibit some uses or developments that may otherwise be approved.

C1.3.1 BUFFERS

The preferred method for determining buffers involves site-specific technical studies (see checklist below). However, in some instances, an alternative is to apply generic separation distances. Generic separation distances, their role and limitations are outlined in *Separation Distances between Industrial and Sensitive Land Uses* EPA Guidance Statement No. 3 (EPA 2005b). It is important to be aware that the generic separation distances developed for Western Australia do not take into account the impacts of emissions on sensitive natural environments, cumulative impacts, health impacts, and non-typical emissions.

Further advice on the use of buffers to protect sensitive land uses is in *State Planning Policy 4.1 State Industrial Buffer Policy* (Government of Western Australia 1997b) and *State Industrial Buffer State Planning Policy 4.1: Draft for Public Comment* (WAPC 2004b).

CHECKLIST OF STEPS TO DETERMINE A SITE-SPECIFIC BUFFER

The process to determine and secure a buffer around an industrial area or a land use likely to emit pollutants should generally include the following steps:

- ☐ Identify the activities likely to cause emissions, types of emissions and issues related to those emissions.
- ☐ Identify relevant environmental principles, policies and industry guidance on environmental best practice measures.
- ☐ Identify existing and future sensitive land uses and developments that may be affected by the emissions, either directly or indirectly.
- ☐ Identify the characteristics and significance of the surrounding natural environment that may potentially be affected by emissions, either directly or indirectly.
- ☐ Identify objectives and criteria for acceptable levels of emissions in relation to sensitive land uses and the environment. Where there are no criteria for Western Australia, criteria may have to be proposed and checked with the Department of Environment and Conservation (DEC) or appropriate experts.
- ☐ Determine an appropriate program for consultation with stakeholders, and implement it.
- ☐ Ascertain acceptable modelling techniques to quantitatively represent potential emissions. Where there are no methodologies or guidelines specifically preferred for Western Australia, propose a draft methodology and check with DoE or appropriate experts. In some localities the cumulative effects of emissions may need to be taken into account.
- ☐ Model projected emission levels.
- ☐ Propose buffer and assess against the environmental objectives.
- ☐ Modify buffer, if necessary, or adopt other management tools as appropriate to meet environmental objectives and criteria.
- ☐ Determine how the buffer will be secured (for example, by zonings, special control areas, scheme provisions and decision-making on subdivision and development applications).
- ☐ Implement the buffer, making provision for ongoing monitoring and review of any buffer mechanisms.

Chapter C2

Air quality

C2.1 BACKGROUND

This chapter provides the advice of the Environmental Protection Authority (EPA) on the protection of air quality during land use planning.

Many land uses and activities either cumulatively or individually have the potential to significantly affect air quality at the local or regional scale.

Emissions to the air affect:

- human health and amenity
- the natural environment
- the community's social and economic pursuits.

Significant contributors of air pollutants in Western Australia include:

- motor vehicles
- industrial activities
- domestic wood burning heaters
- ore refineries, petrochemical and solvent-based industries
- landfill sites
- power stations which combust fossil fuels
- land clearing activities, mining, agriculture and forestry
- bush fires and fuel reduction burns.

Air pollutants in Western Australia include sulfur dioxide, nitrogen oxides, carbon monoxide, photochemical oxidants (ozone), inhalable and fine particles, lead, dust, volatile organic compounds (for example, benzene), fluorides, hydrogen sulphide, odorous gases, heavy metals, dioxins, furans, polycyclic aromatic hydrocarbons and other toxic compounds.

The main concerns for Perth are photochemical smog in summer, particle haze during winter, and local air quality problems.

In the regional areas of Western Australia, causes of air pollution episodes include bushfires, agricultural and mining activities, and industrial facilities.

The enhanced greenhouse effect is another significant issue for Western Australia.

C2.1.1 ISSUES

Issues of relevance to land use planning in Western Australia include, but are not limited to:

- locating and managing land uses and development to avoid or minimise conflicts between **sensitive land uses** and activities releasing emissions to air
- locating and managing land uses and development to avoid unacceptable impacts from air emissions on the environment
- implementing planning responses to international, regional and local air quality issues. Modelling by research organisations such as Commonwealth Scientific and Industrial Research Organisation (CSIRO) shows that urban planning can affect air quality (DEP 2000a)
- planning to reduce dependence on roads and motor vehicles
- planning to encourage efficient use of energy
- managing land development and other activities to avoid problems from dust
- managing potential land use conflicts associated with emissions from agricultural premises including spray drift, odour and dust.

TERMS

Photochemical smog is caused by sunlight reacting with nitrogen dioxide and reactive organic compounds to form photochemical oxidants (measured as ozone). High temperatures in summer can increase the rate of formation. Photochemical smog can affect health and damage the environment (Government of Western Australia 1998a). The pollutants causing photochemical smog are mainly from motor vehicles and industrial emissions (DEP 2000a).

Haze is the presence of very small airborne particles in concentrations large enough to impede vision. Haze poses a health risk and has aesthetic implications. While the main source of haze in Perth is smoke from domestic wood heaters, other important sources include motor vehicle emissions (notably from diesels), and particulates formed from combinations of other pollutants and naturally-occurring airborne particulates.

The **enhanced greenhouse effect** is the alteration of the world's climate system caused by increasing levels of certain gases in the Earth's atmosphere. These gases (mainly from fossil fuel use, ruminant digestion and land clearing) cause higher average air temperatures in the lower atmosphere, changed rainfall patterns, warmer oceans and rising sea levels. Impacts are experienced globally (Western Australian Greenhouse Task Force 2004).

C2.2 EPA'S BROAD PRINCIPLES FOR THE PROTECTION OF AIR QUALITY

EPA's objective

To ensure that air emissions to air do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards (EPA 2004e).

The EPA's broad principles for the protection of air quality with particular reference to land use planning and development are as follows.

Minimise emissions and meet acceptable standards

To protect the environment and the health, welfare and amenity of people and their activities, air pollutants from individual land uses should:

- be as low as reasonably practicable at the point of discharge
- comply with best practice measures as outlined in EPA (2003b)
- meet agreed environmental objectives and recognised criteria for each pollutant
- keep contributions to cumulative impacts within acceptable levels.

Criteria include those in the National Environment Protection (Ambient Air Quality) Measure, the National Environment Protection (Air Toxics) Measure, *Environmental Protection (Goldfields Residential Areas) (Sulfur Dioxide) Policy 2003* and the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999*.

An integrated approach to air quality protection

In view of the importance of clean air and the complex nature of some air emissions problems, all stakeholders have a responsibility to contribute to integrated approaches to the protection of air quality. In Perth, this key role for land use planning has been identified in the Perth Air Quality Management Plan (DEP 2000a).

Contain emissions

New land uses and activities associated with air emissions should be located and managed so that it is unlikely that pollutants will adversely affect existing and future sensitive land use areas. The order of preference is:

1. avoid any avoidable impacts
2. contain emissions within the individual industry site boundary
3. contain emissions within the industrial estate or same land use zone
4. contain emissions within an agreed **buffer**.

Protect sensitive land uses

There should be a general presumption against the establishment of residential and other sensitive land uses in industrial areas and other areas where air quality issues are likely to arise, including buffer areas. Should a sensitive use be deemed acceptable after thorough analysis of all relevant considerations and consultation, planning requirements should be imposed to ensure that appropriate air quality criteria can be maintained at the sensitive use.

Obtain adequate information

Where there are gaps in information or understanding, the **precautionary principle** should be applied. EPA Draft Guidance Statement No. 3 *Separation Distances between Industrial and Sensitive Land Uses* (EPA 2005b) provides generic guidance on separation distances that should be considered in the absence of adequate site-specific studies and modelling of emissions.

Incorporate new information

New information on air emissions needs to be considered and incorporated into **strategic planning** and statutory approval processes as it becomes available.

Implement State Government Greenhouse Strategy

The EPA expects that the enhanced greenhouse effect will be largely managed through the development and implementation of the Western Australian Greenhouse Strategy (Western Australian Greenhouse Task Force 2004). The EPA applies the guidelines outlined in EPA Guidance Statement No. 12 *Minimising Greenhouse Gas Emissions* (EPA 2002c) to proposals assessed by the EPA.

C2.2.1 EPA'S PUBLISHED POSITION ON AIR QUALITY

The EPA has published the following guidance statements to assist consideration of particular air quality issues:

- *Separation Distances Between Industrial and Sensitive Land Uses* Final Guidance Statement No. 3 (EPA 2005b)
- *Guidance Statement for Minimising Greenhouse Gas Emissions* Final Guidance Statement No. 12 (EPA 2002c)
- *Management of Air Emissions from Biomedical Waste Incinerators* Final Guidance Statement No. 13 (EPA 2002d)
- *Emissions of Oxides of Nitrogen from Gas Turbines* Final Guidance Statement No. 15 (EPA 2000d)
- *Prevention of Air Quality Impacts from Land Development Sites* Final Guidance Statement No. 18 (EPA 2000e)
- *Odour as a relevant Environmental Factor* Interim Guidance Statement No. 47 (EPA 2002f).
- *Implementing best practice in proposals submitted to the environmental impact assessment process* Final Guidance Statement No. 55 (EPA 2003b).

C2.3 CONSIDERING AIR QUALITY DURING PLANNING

Advice to complement the broad principles above and assist planning to protect air quality is outlined in this section. **Broad scale planning** and **local area planning** are addressed in C2.3.1 and C2.3.2. Advice on air quality studies and modelling to support planning projects is in C2.3.3. Some specific issues are then addressed, namely odour (C2.3.4), dust (C2.3.5), agricultural activities (C2.3.6), Kwinana Industrial Area (C2.3.7), and Kalgoorlie and the Goldfields (C2.3.8). Department of Environment and Conservation (DEC) publications with guidelines for selected industries are listed in E3.5.

C2.3.1 BROAD SCALE PLANNING

The EPA recommends that careful consideration be given to regional and local air quality issues at the broad scale planning stages (strategic planning and town and regional planning schemes).

Strategies for land use and transport planning recommended in the Perth Air Quality Management Plan (DEP 2000a), State Planning Policy No. 2 (Government of Western Australia 2003b) and the State Sustainability Strategy (Government of Western Australia 2003a) include:

- designing cities to minimise the amount of travel required, particularly private car travel, and the amount of inter-regional traffic
- encouraging higher levels of self-containment, that is, encouraging social, commercial and employment opportunities in the local environment, and near residential development
- integrating transport and land use planning
- encouraging good public transport provision, and cycling and pedestrian access
- promoting the use of energy efficient principles in domestic, government, commercial and industrial building development
- promoting the use of energy efficient principles in planning for subdivisions and localities (including orientation of building lots for solar efficiency)
- incorporating air quality issues in the development of the greater Perth region

- assessing local and regional air quality impacts when considering road network planning
- facilitating the development of home-based employment and business through appropriate planning provisions
- managing regional parking
- supporting an increase in the use of energy rating schemes for buildings
- assessing the potential for conflict between sensitive land uses and activities which impact on air quality
- supporting the retention of existing vegetation and revegetation in subdivision and development proposals (carbon sinks)
- supporting the use of alternative energy generation, including renewable energy, where appropriate
- supporting adaptation measures, to respond to climate change.

It is important that new land use areas that release air emissions (as well as nearby sensitive land uses) are carefully planned and located with regard for local meteorological conditions and topography. Problems typically arise when sensitive land uses are downwind of industrial land uses.

For some regional and urban areas, information on air quality is available, and should be taken into account during broad scale planning.

Where planning strategies raise significant air quality issues, it is recommended that air quality studies and modelling are carried out in the early stages of planning to ensure that environmental objectives can be met and to provide greater certainty for the subsequent stages of planning. Assessment of air quality impacts is important in the case of strategic industrial areas, major industries and infrastructure such as wastewater treatment plants and main roads.

In areas where information on air quality continues to be acquired, land use planners are urged to consider the latest findings and adopt appropriate planning responses.

Further general advice to assist in achieving good environmental outcomes through broad scale planning is provided in A1.4.1.

C2.3.2 LOCAL AREA PLANNING

Section C1.3 presents a comprehensive list of considerations that help to ensure that the potential impacts of emissions, including air emissions, are adequately taken into account by planning agencies and applicants during decision-making on rezonings, detailed structure plans, subdivisions and development applications. The considerations are applicable to proposed developments and land uses associated with air pollutants, and to new sensitive land uses near potential sources of air pollution.

When air emissions and impacts are a key issue, it is recommended that adequate technical information be provided prior to planning decision-making. It will usually be the applicant's responsibility to provide this to the planning agency to enable the agency to make an informed decision. In some situations, the generic separation distances between industrial and sensitive land uses in EPA (2005b) can provide useful guidance in the absence of site-specific technical information.

To ensure environmental objectives are met, enforceable planning conditions may need to be applied by the planning agency. Consider whether conditions are required for particular stages of development, for example, construction, operation and/or decommissioning.

The following are examples of requirements that can help to manage air emissions:

- Prepare and implement an air quality or dust management plan to the satisfaction of the responsible planning authority (possibly on advice of an independent accredited auditor). The key components of **environmental management plans** are listed in Attachment A1- 2.
- Control dust (see example of guidelines in DEP 1996a).
- Prepare and implement an agricultural impact assessment and implementation plan to the satisfaction of the responsible planning authority (possibly on advice of an independent accredited auditor).
- Maintain specified separation distances or barriers.

Sometimes memorials are imposed on the titles of premises likely to be used for residential or other sensitive uses advising of potential chemical spray drift, odour, dust or other air emissions. Developers may alternatively be required to advise prospective purchasers of nearby land uses. The EPA prefers that new developments are located to avoid the need for these forms of advice.

C2.3.3 AIR QUALITY STUDIES

Air quality studies can assist planning decision-makers to establish whether planning proposals can meet air quality objectives and criteria. Studies may include both monitoring and modelling components.

The DEC has prepared air quality and air pollution modelling guidance notes (DEP 2000b) and an odour methodology guideline (DEP 2002b) to assist applicants to carry out air quality studies. Guidance on addressing **greenhouse gases** in relation to the EPA's environmental impact assessment process is in EPA (2002d).

When studies are carried out it is important that they are conducted to a high standard and the scale and scope is appropriate to the relevant issues. In some circumstances, it will be helpful for an independent auditor with appropriate expertise to advise on the technical adequacy of studies and the validity of conclusions. In some cases, DEC may be able to provide advice on a particular study.

C2.3.4 ODOUR

Odour is consistently recorded as the cause of about one-third of all public complaints received by DEC. Most odour complaints received by the DEC against industry have centred on animal products processing activities (EPA 2002f) and relate to:

- frequency of the odour occurrence
- intensity of the odour
- duration of the exposure to the odour
- offensiveness of the odour
- location of the odour.

Odour is largely an amenity issue for residential and sensitive land uses. However, in some instances, odour may indicate an emission with health and/or ecological effects.

It is expected that land use planning will consider potential odour impacts on new residential areas and other sensitive land uses from such land uses as agricultural, industrial and infrastructure activities, and will use planning mechanisms to avoid land use conflicts.

Odour may require consideration at the strategic planning, rezoning, subdivision and development stages.

Advice on separation distances between sensitive land uses and land uses with gaseous, noise, dust and/or odour emissions is provided in EPA (2005b). The EPA recommends that generic separation distances are maintained unless adequate site-specific studies have been carried out that demonstrate that a lesser distance will not cause unacceptable amenity impacts.

Planning policies and other guidelines of relevance to some odour issues have been developed in consultation with the environmental agencies. These include State Planning Policy 4.3: *Poultry Farms Policy* (Government of Western Australia 1998f) and the *Draft Environmental Code of Practice for Poultry Farms in Western Australia* (Western Australian Broiler Growers Association et al 2004).

Guidance on methodology for odour sampling and analysis, computer modelling of odour impacts, and reporting is in DEP (2002b).

The criteria in EPA Guidance Statement No. 47 *Assessment of Odour Impacts from New Proposals* (EPA 2002e) were under review at the time of publication of this guidance statement. An interim Guidance Statement No. 47 on *Odour as a relevant Environmental Factor* is currently available on the EPA website (www.epa.wa.gov.au)

C2.3.5 DUST

Atmospheric dust and particulate matter at levels associated with public health risks and/or public nuisance may potentially be generated by a variety of land uses and activities. These include industrial and mining activities, construction works associated with urban development, land clearing, bulk handling of products at ports, grain loading and agricultural activities. Nuisance may arise from small point sources, for example, quarries and landscape supply businesses, and permanent unsealed surfaces such as roads. Sometimes natural conditions cause problems for people, such as sand blow from dunes.

Dust and particulate matter may also have significant ecological impacts. For example, plants such as mangroves, can be affected by the accumulation of large amounts of dust on leaves, which may result in the deterioration of plant health or death.

Many dust issues are most appropriately managed through planning and local government requirements, such as subdivision and development requirements. Where activities that may create atmospheric dust and particulates are proposed, the EPA recommends that applicants and decision-making authorities implement a best practice management plan to control dust.

The EPA's broad advice on the management of dust from land development sites is provided in EPA Guidance Statement No. 18 *Prevention of Air Quality Impacts from Land Development Sites* (EPA 2000e). More detailed guidelines are in preparation and will update the advice in DEP (1996a).

C2.3.6 AGRICULTURAL ACTIVITIES

Market gardens, orchards, plantations, poultry farms, piggeries and other agricultural activities can be associated with a number of local air quality issues, for example, chemical spray drift, dust and odour.

It is expected that land use planning processes will consider potential conflicts between these uses and new residential areas or other sensitive land uses, and will use planning mechanisms to avoid land use conflicts. Relevant planning policies and guidance developed by the Western Australian Planning Commission (WAPC) following consultation with DEC, EPA and other agencies include *State Planning Policy No. 2: Environment and Natural Resources Policy* (Government of Western Australia 2003b), *State Planning Policy 4.3: Poultry Farms Policy* (Government of Western Australia 1998f) and WAPC Planning Bulletin No. 63 *Policy for Dealing with Conflicts Between Residential Subdivision and Market Gardens in East Wanneroo* (WAPC 2003c). Some inter-organisation environmental management guidelines for specific agricultural activities are listed in E5.

Other useful references are *Separation Distances Between Industrial and Sensitive Land Uses* (EPA 2005b) and *Planning Guidelines Separating Agricultural and Residential Land Uses* (Department of Natural Resources Queensland 1997).

C2.3.7 KWINANA INDUSTRIAL AREA

The Kwinana Industrial Area is the State's major heavy industrial area with most of the industry concentrated along an 8 km strip of coastal land next to Cockburn Sound, 25 km south of Perth.

To maintain acceptable air quality around the Kwinana Industrial Area, the EPA developed the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy*, known as the Kwinana EPP. This policy applies to the local government areas of Cockburn, Kwinana and Rockingham. The policy area is divided into three regions:

- Area A – the industrial area near Cockburn Sound and in part of Munster
- Area B – a buffer area surrounding Area A
- Area C – land predominantly used for rural and residential purposes outside Area B.

For each of these areas, the policy sets out, in regulations, air quality objectives and ambient standards and limits for sulfur dioxide and total suspended particulates. These are managed through conditions on environmental licenses.

The EPA does not support an intensification of residential and sensitive development in the buffer to the Kwinana Industrial Area.

In addition to its purpose under the Kwinana EPP, the boundary of Area B has been used to represent the extent of the general purpose planning buffer around the Kwinana Industrial Area. At the time of publication of this Guidance Statement, the extent of the planning buffer was under review (WAPC 2002).

C2.3.8 KALGOORLIE AND THE GOLDFIELDS

Sulfur dioxide emissions have been a significant environmental and health issue in Kalgoorlie. To maintain acceptable sulfur dioxide concentrations in the air around residential areas in the Goldfields, the EPA developed the *Environmental Protection (Goldfields Residential Areas) (Sulfur Dioxide) Policy 2003*, known as the Goldfields EPP.

The EPP establishes, through regulations, air quality sulfur dioxide concentrations in Goldfields residential areas. These concentrations are managed through licenses issued to sulfur dioxide-emitting industries.

In the Goldfields, the EPA expects new residential development to be within the areas protected by the EPP.

Proposals that are developed for the area subject to the EPP should demonstrate compliance with the EPP's objectives and management measures.

C2.4 REFERRAL TO THE EPA

This section should be read in conjunction with the generic advice in A3.2.1 (referral of schemes to the EPA) and A4.2.1 (referral of proposals to the EPA).

C2.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

The referral of a major development proposal that has the potential to release emissions to air should be considered if:

- the potential emissions are not likely to be satisfactorily managed through other approval processes (for example, licensing by DEC) to meet all recognised criteria
- the proposal is a major emitter of greenhouse gases
- for any other reason, advisory or regulatory agencies (for example, DEC) have significant concerns. For example, there may be a potential for air quality criteria to be exceeded due to the proposal's contribution to cumulative emissions in a region.

Examples of proposals that may require referral:

- a major industrial development, for example, petrochemical project
- a major mineral or gas refining project
- a major infrastructure project, for example, wastewater treatment plant.

Prior to a decision-making authority making a referral to the EPA, the EPA recommends that information is first obtained by the authority to establish the characteristics of potential emissions to air and whether they can be managed satisfactorily through other approval processes.

The EPA does not expect the referral of a proposal on the basis that it is sensitive to air emissions (for example, residential development near an industrial area) as the EP Act provides that the proposal itself should be likely to have a significant impact on the environment. Land use planning processes are expected to address the location and development of new land uses that are sensitive to emissions, to prevent land use conflicts.

C2.4.2 INFORMATION TO ACCOMPANY A REFERRAL

Information that may assist the EPA to set an appropriate level of assessment on a scheme or proposal includes the following:

- a description of all likely emissions to air and their characteristics
- a description of factors that may influence air emissions, for example, topography and weather conditions
- a description of the proposed site and process management having regard for best practice as described in EPA (2003c)
- a list of all approvals that are required
- modelling of air emissions in accordance with DEC criteria (see C2.3.3)
- identification of recognised criteria for emissions
- comparison of the results of modelling with recognised air quality criteria
- results of any consultation carried out with agencies, stakeholders and the public.

The EPA Service Unit will review any information submitted and if not sufficient for the EPA to decide the level of assessment of the proposal or whether or not to assess the scheme, additional information may be requested. Where further information is required and where possible, please provide all relevant data in digital and GIS format.

Chapter C3

Water management

C3.1 BACKGROUND

This chapter provides the advice of the Environmental Protection Authority (EPA) to participants in land use planning processes on protecting water quality and quantity in relation to the following water management issues: total water cycle management, stormwater, point source pollution and on-site effluent management.

Cumulatively or individually, most land uses have an impact on the environment through their water usage and stormwater and waste water discharges.

Poor water quality in water resources (groundwater, wetlands, rivers, estuaries and coastal water) typically results from the combined effects of a variety of land-based activities. These contribute a range of pollutants to water including:

- salt from land clearing, irrigation and salinity management practices
- nutrients (particularly nitrogen and phosphorus) from fertilisers, animal waste and on-site effluent disposal systems in agricultural and urban areas
- sediment from construction sites, drainage systems, cleared land and agricultural areas
- oil, grease, heavy metals and a range of chemicals from residential, industrial and commercial areas
- oxygen-demanding substances from organic matter
- thermal pollution from removal of riparian vegetation and some industries
- micro-organisms (including pathogens) from livestock, pet wastes and faulty septic systems
- toxic organics, for example, from pesticides or sewage
- acidity from agricultural and salinity management practices
- acid drainage from dewatering activities and excavation in areas of acid sulfate soils
- litter and gross pollutants.

Water quantity and flows are also affected by a range of land use practices including stormwater and wastewater management systems, irrigation, damming, pumping and changes to the land's surface (for example, re contouring for urban development, and increasing the extent of impermeable areas).

Poor water quality and changes to water regimes contribute to the following environmental problems:

- deterioration of environmental health and **ecosystem services**
- deterioration of conservation areas, wetlands, waterways and coastal waters

TERMS

Total water cycle management or integrated water cycle management is the holistic management of water including water supply, stormwater and wastewater, in accordance with the principles of sustainability (as defined in Government of Western Australia 2003a), to maintain the integrity of the water cycle. The water cycle is the recirculation of water through precipitation, flows on and in the land, interception and storage, treatment and supply, water use, management of stormwater and wastewater, discharge to rivers and oceans, evaporation and transpiration and cloud formation.

Stormwater is water flowing over ground surfaces and in natural streams and drains as a direct result of rainfall over a catchment (ARMCANZ & ANZECC 2000).

Point source pollution is pollution resulting from a specific localised activity or land use (as opposed to pollution resulting from the cumulative emissions of many individual activities).

Effluent is wastewater that has been used for some purpose and would normally be treated and discarded. It usually contains pollutants.

Water sensitive urban design (WSUD) is a design philosophy that provides a framework for managing water-related issues in urban areas. WSUD incorporates the sustainable management and integration of stormwater, wastewater and water supply into urban design. WSUD principles include incorporating water resource management issues early in the land use planning process. WSUD can be applied at the lot, street, neighbourhood, catchment and regional scale.

- loss or deterioration of ecological communities and adverse impacts on species
- health risks to people
- **land degradation** from salinity and rising groundwater
- reduction in quality water for human activities and consumption
- loss or deterioration of recreation, aesthetic, cultural and heritage values.

Traditionally, government authorities have managed water supply, stormwater and wastewater separately. This limits the ability to achieve environmental objectives. The focus is now on managing water and impacts on water resources through a holistic catchment approach in accordance with the principles of ecological sustainability. This is known as total water cycle management or integrated water cycle management. Water efficiency, re-use and recycling are integral components of total water cycle management (DoW 2004).

C3.2 EPA'S BROAD PRINCIPLES FOR WATER MANAGEMENT

EPA's objectives

To maintain the quantity of water (surface and ground) so that existing and potential environmental values, including ecosystem maintenance, are protected.

To ensure that the quality of water emissions (surface, ground, and marine) does not adversely affect environmental values or the health, welfare and amenity of people and land uses, and meets statutory requirements and acceptable standards.

(EPA 2004e)

The EPA's broad principles for the management of water are as follows:

Total water cycle management

The EPA favours the application of a total water cycle management approach that recognises that water supply, stormwater and wastewater management are interrelated components of **surface water** and groundwater catchment systems.

Framework for water management

Water management in regions and local areas should occur within the framework of an **environmental management system** developed through a consultative process involving the community and all stakeholders. The EPA supports the application of a framework based on the AS/NZS ISO 14004:2004 environmental management system model. Appropriate frameworks based on this model are outlined in:

- *Implementation Framework for Western Australia for the Australia and New Zealand Guidelines for Fresh and Marine Water Quality and Water Quality Monitoring and Reporting* (Government of Western Australia not dated)
- *Environmental Protection in Natural Resource Management* (EPA 2005a). An outline of the EPA's overarching natural resource management framework is in Attachment C3-1.

These models require that **environmental values** in relation to water/natural resources are identified. Then, for each value, a set of **environmental objectives** is developed, and for each objective, **environmental criteria** or benchmarks are developed. To achieve the objectives, environmental management plans are prepared and implemented, and regularly evaluated and improved.

Where an overarching regional framework or strategy for water management has been adopted, local plans and actions should be consistent with the regional approach.

Integration of management actions

Improved integration between catchment and natural resource management initiatives, water supply, stormwater and wastewater management, land use planning, water service providers, government agencies and the community is pivotal to ensuring the ecologically sustainable management of water.

Best practice and continuous improvement

Activities that have the potential to adversely affect water resources should adopt the principles of:

- best practice
- continuous improvement
- waste avoidance and minimisation.

The EPA's concept of best practice is described in EPA (2003b). Continuous improvement and the EPA's hierarchy for waste management are outlined in EPA (2004a).

Restoration of degraded natural resources

Where water management activities have contributed to site contamination or land or water degradation, actions to improve and restore degraded water and land resources should be implemented.

Precautionary approach

Where environmental values and objectives for water resources are yet to be established through an accredited consultative process, or it is uncertain whether a set of management actions will ensure that objectives are met, a precautionary approach should be adopted.

State Water Quality Management Strategy

These principles should be read in conjunction with the overarching water quality management strategies agreed for Western Australia as set out in Table 2 in the State Water Quality Management Strategy: No. 1 Framework for Implementation (Government of Western Australia 2001), and available at www.water.wa.gov.au.

C3.2.1 EPA'S PUBLISHED POSITION ON WATER MANAGEMENT

EPA initiatives specifically on water protection issues include the following environmental protection policies and guidance statements:

State environmental policy and environmental protection policies

- *State Environmental (Cockburn Sound) Policy 2005*
- *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1997*
- *Environmental Protection (Swan and Canning Rivers) Policy 1997*
- *Environmental Protection (Gnangara Mound Crown Land) Policy 1992*
- *Environmental Protection (Peel Inlet–Harvey Estuary) Policy 1992*
- *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992.*

Guidance statements

- Draft Guidance Statement No. 48 *Groundwater Environmental Management Areas*
- Final Guidance Statement No. 28 *Protection of the Lake Clifton Catchment.*

A preliminary list of key government policies and guidelines is in Table C1.

C3.3 CONSIDERING WATER MANAGEMENT DURING PLANNING

The protection of water in the environment to a large extent depends on appropriate land uses, development activities and management practices in the catchment. The EPA urges that the careful consideration and protection of water quality and water resources are an integral part of broad scale land use planning and planning decision-making.

Participants in land use planning can assist the protection of healthy water resources through:

- awareness and application of overarching principles and strategies for water management (some key strategies are listed in Table C1)

- integration with other regulatory processes that influence water management (an introductory list of relevant agencies is in Table C1)
- developing planning responses that recognise the interrelationships between land use and land management practices, water quality, water supply, water efficiency, reuse, recycling and stormwater and wastewater management (this process is known as water sensitive urban design)
- consideration of and integration (as appropriate) with regional and local initiatives for managing water and natural resources. These may include:
 - water management plans that have been initiated specifically to assist land use planning
 - total water cycle management plans which address multiple aspects of water, for example, public water supply, stormwater management and reuse, environmental water requirements, effluent management and/or reuse of wastewater
 - catchment management plans
 - strategies for natural resource management and repair
 - salinity recovery plans and other salinity management reports
 - wetlands and waterways protection/management plans
 - water resource allocation plans
 - drinking water source protection plans and drinking water source protection assessments.

C3.3.1 BROAD SCALE PLANNING

The EPA urges that planning responses to water management issues are considered and developed from the earliest stages of planning. The application of the checklist on the following page during strategic planning, structure planning and the formulation of schemes will assist in the protection of healthy water resources.

C3.3.2 LOCAL AREA PLANNING

Section A1.4.2 presents a comprehensive framework of actions and considerations to help ensure that environmental issues are adequately taken into account during decision-making on rezonings, detailed plans, subdivisions and development applications.

To achieve water management objectives, the EPA particularly urges that planning decision-makers (where planning processes allow) and applicants:

- Ensure consistency with overarching and regional water, catchment and natural resource management strategies, principles, policies, guidelines and plans.
- Ensure sufficient information is available for informed decision-making on the particular proposed development or land use. The information should be sufficient to demonstrate whether or not the projected water use and water discharges will be managed consistent with recognised environmental objectives and criteria.
- Consult with relevant environmental agencies, including the Department of Water and others, as appropriate.

Advice is provided in the following sections on stormwater management, point source pollution and on-site effluent management.

C3.3.3 STORMWATER MANAGEMENT

Stormwater impacts on the environment are influenced by land use planning through regulation of the type and location of new development, the approval of site plans and the setting of development requirements/conditions.

CHECKLIST FOR CONSIDERING WATER ISSUES DURING BROAD SCALE PLANNING

- ☐ Identify the surface water and groundwater resources in the planning area and their key characteristics. Identify catchment areas (these may extend outside the planning areas) and off-site water resources that may be affected by actions in the planning area. Identify the significance of water resources and existing impacts and threats to water resources taking into account the particular catchment characteristics.
- ☐ Identify water related issues for the planning area and priority issues. Types of issues include:
 - ☐ the protection of ecosystem health and services
 - ☐ the protection of conservation areas
 - ☐ the availability and demand for water (integration between the regulation of water resource allocation and land use zoning provisions is an important issue)
 - ☐ the protection of public drinking water supplies (see Chapter B6)
 - ☐ repair of land and water degradation and avoidance of further degradation
 - ☐ stormwater management
 - ☐ wastewater and effluent management
 - ☐ reducing water usage
 - ☐ avoidance and minimisation of wastewater
 - ☐ reusing water
 - ☐ protection of property from flooding and waterlogging
 - ☐ the management of land uses associated with point source pollution
 - ☐ specific environmental problems, for example, salinisation, eutrophication, sedimentation, acidification, waterlogging
 - ☐ management of acid sulfate soil risk areas
 - ☐ aesthetics, cultural and recreational use associated with water resources
 - ☐ the protection of off-site water resources.
- ☐ Consult with the community, agencies and stakeholders on planning responses to water issues.
- ☐ Identify overarching environmental objectives and principles for water management contained in government and accredited regional water, catchment and natural resource management strategies, policies, guidelines and plans (Table C1 provides a starting point).
- ☐ Identify potential environmental impacts, benefits and threats to water resources from land planning scenarios, and the significance of potential impacts.
- ☐ Determine whether sufficiently detailed environmental values, objectives, targets and criteria for water resources been identified for the study area, for planning purposes. A water management strategy may need to be developed to identify appropriate objectives and guidance for the study area. Where a water management strategy is required and is yet to be finalised, decision-making should take the precautionary approach.
- ☐ Consider site capability for the different land use categories under consideration. Development should not proceed where it poses a risk to achieving objectives and criteria for water resource management.
- ☐ For preferred land use options, check whether key environmental objectives and criteria can be met. This may entail technical studies and modelling in the early stages of planning.
- ☐ Select land use options that minimise risk to the environment.
- ☐ Include provisions in planning strategies and planning schemes that reflect the key objectives and requirements of government and accredited regional water, waste and natural resource management strategies.
- ☐ Define processes and criteria to be followed at the subsequent stages of planning to ensure objectives for water resources and discharges are pursued, including provision of more detailed information, management plans and monitoring procedures, at appropriate times.
- ☐ Work with the responsible parties to promote an integrated approach to water management.

Guidance on best management principles and practices for managing stormwater in Western Australia is published in the *Stormwater Management Manual for Western Australia* (DoW 2004-2007) and related documents. These are available on www.water.wa.gov.au.

The *Stormwater Management Manual for Western Australia* recommends the following approaches for stormwater management to guide planners, developers and government, based on the objectives for water sensitive urban design:

- protect water quality
- protect infrastructure from flooding and inundation
- minimise run-off
- maximise local infiltration
- make the most of nature's drainage
- minimise changes to the natural water balance
- integrate stormwater treatment into the landscape
- convert drains into natural streams.

A stormwater management hierarchy indicates the approaches that are appropriate in specific situations. The hierarchy recommended for Western Australia is:

1. retain and restore natural drainage lines
2. implement non-structural source controls
3. minimise run-off
4. use in-system management measures.

The *Stormwater Management Manual for Western Australia* provides more detail on the above approaches and hierarchy.

The manual advises that '...planners can help protect stormwater quality by ensuring the land is capable of sustaining urban development and follows the principles of water sensitive design to minimise the extent of impervious surfaces and provide adequate space for stormwater management and integrate stormwater quality treatment measures with public open space. New stormwater infrastructure should be designed to ensure the impact of stormwater on receiving environment is minimal'.

Management measures based on natural systems and processes (for example, retention of natural drainage lines, use of vegetation to slow and absorb stormwater) are preferred. Where necessary these should be supplemented by constructed management measures, for example, 'in-system' vegetated swales and soil filters (bioremediation systems).

Where significant development is proposed in a catchment, the EPA urges that it does not occur ahead of a catchment-based stormwater management plan. It is recommended that an integrated land and water management strategy, addressing stormwater management as part of total water cycle management, is prepared as an integral part of the early planning process. However, the need for such a strategy will depend on the particular planning situation.

Stormwater management measures

This section provides examples of management measures potentially applicable to decision-making on specific rezonings, subdivisions, developments and detailed plans. This should be used as a checklist in the absence of a catchment-based water management plan (see over).

Standard components for management plans are listed in Attachment A1-2.

CHECKLIST OF STORMWATER MANAGEMENT MEASURES

- ☐ Apply best planning and management practices consistent with water sensitive urban design principles, having regard for Liveable Neighbourhoods (WAPC latest version), Stormwater Management Manual for Western Australia (DoW 2004) and latest DoW guidance.
- ☐ Apply measures to protect and restore existing water resources including waterways, wetlands and their associated vegetation (see measures in Chapter B4 on wetlands and Chapter B5 on waterways), consistent with objectives set for the protection of each of these components.
- ☐ Retain natural drainage lines and consider integrating with multiple use open space corridors.
- ☐ Convert existing drains into constructed waterways ('living streams') with flood storage accommodated along the streamline.
- ☐ Retain vegetation or create vegetated areas to promote on-site infiltration and utilisation of stormwater.
- ☐ Allow enough land within the development site to maintain the total water cycle balance within the development area relative to pre-development conditions. Surface and groundwater quality within the development area should be maintained or improved relative to pre-development conditions. Consider the off-site implications of any proposed changes to slope and increased areas of impervious surfaces.
- ☐ Prepare and implement environmental management plans, for example:
 - ☐ a water management plan addressing, as appropriate, stormwater, irrigation water, wastewater, nutrients, fuels, chemicals and wastes that may contaminate stormwater
 - ☐ a dewatering management plan
 - ☐ an acid sulfate soil management plan.

C3.3.4 POINT SOURCE POLLUTION

Point source pollution originates from a known point. The most severe point source pollution generally results from localised spills of chemicals, or where chemicals or contaminated wastewater is disposed of into surface water drains or into the ground. Land uses and activities that have been associated with polluting spills or wastewater discharges include:

- waste water treatment facilities
- industries
- abattoirs
- landfill sites
- chemical manufacturers/transporters
- sheep and cattle dips
- intensive agriculture
- tailing ponds on mine sites.

A list of land uses associated with contamination is provided in Potentially Contaminating Activities, Industries and Landuses (DoE 2004f).

Point source pollution is a direct threat to water quality and the environment generally. It is therefore necessary to ensure that any potential for point source pollution is identified during land use planning to prevent or minimise its impacts on the environment.

Some sources of point source pollution are regulated by DEC under Part V Environmental Protection Act 1986 (EP Act) or the Environmental Protection (Controlled Waste) Regulations 2001. The Department of Industry and Resources (DoIR) regulates the storage, handling and transport of dangerous goods, including explosives, under the Dangerous Goods Safety Act 2004. However, not all land uses associated with point source pollution are managed through the above licensing processes.

Land use planning processes may significantly influence environmental outcomes through locating land use zones, determining acceptable land uses in specific areas, approval of site plans, and setting conditions on development. Where provision is to be made for land uses with the potential for significant point source pollution, it is recommended that the following checklist be applied.

CHECKLIST FOR CONSIDERING POINT SOURCE POLLUTION

- ☐ Identify potential sources of pollution, pollutants, site conditions and processes that may contribute to point source pollution.
- ☐ Identify the environmental values, objectives and criteria for the receiving environment, including receiving water resources. These should be consistent with any overarching water management strategy for the region, or be conservatively based if an overarching strategy is yet to be developed.
- ☐ Check to what extent other regulatory processes (for example, DoW and DoIR licensing) can effectively address environmental issues. Check that best management practices and appropriate management plans will be applied. The EPA's concept of best management practice is outlined in EPA Guidance Statement No. 55 (EPA 2003b).
- ☐ Check whether all potential environmental impacts can be adequately managed to meet recognised environmental objectives and criteria.
- ☐ Check whether setbacks from water resources of development components are sufficient to ensure that the level of protection assigned to the water resources can be maintained.
- ☐ Consult with relevant agencies, organisations and the community.
- ☐ Relevant site plan, design and management considerations may include the following (note: some of these may be required by other processes):
 - ☐ Store and use materials, including fuels and wastes, that may pose a threat to water resources in weatherproof compounds of sufficient capacity and designed to allow recovery of spills.
 - ☐ Ensure transfer areas for wastes, fuels and so on are designed to minimise the likelihood of pollution, and, in the event of an accident, permit recovery of spills.
 - ☐ Protect stormwater run-off from potential sources of contamination, and design the stormwater management system to separate rainfall run-off from potentially polluted areas (for additional treatment prior to discharge) and allow recovery of pollutants in the event of an accident or other incident.
 - ☐ Check proposed method of disposal of any process wastewater (obtain independent advice/environmental agency advice, as appropriate).
- ☐ Promote the principle of waste minimisation, as far as practicable.
- ☐ Require the preparation and implementation of environmental management plans as appropriate, for example:
 - ☐ a management plan for potentially polluting materials
 - ☐ a waste management plan
 - ☐ stormwater management plan
 - ☐ contingency plan or emergency response plan for spills
 - ☐ an overarching environmental management system prepared in accordance with AS/NZS ISO 14004.
- ☐ Ensure that monitoring, reporting and follow-up action as appropriate will be carried out after approvals have been issued.

Elements that typically are expected to be included in environmental management plans for the management of potentially polluting materials are given below:

- ☐ a description of the potentially polluting materials/chemicals/wastes
- ☐ risk assessments (accidental spills) and an explanation of how risks are to be minimised (mitigation strategies, storage, bunding)
- ☐ quality assurance procedures and staff training
- ☐ communication, tracking and reporting
- ☐ disposal/treatment/re-use sites and transport requirements, including relevant approvals and licences.

C3.3.5 ON-SITE EFFLUENT MANAGEMENT

This section addresses on-site effluent management on individual premises. On-site wastewater systems particularly at higher densities have the potential to harm the environment, human health and local amenity.

Domestic wastewater contains human sewage, paper, soap and detergent residues and food scraps suspended in water. Components that have the potential to harm the environment include:

- nutrients such as nitrogen and phosphorus. High nutrient levels (eutrophication) in water bodies contribute to algal growth and may harm aquatic ecosystems.
- organic matter which can deplete dissolved oxygen in water when biodegrading and may cause foul odours
- pathogens and bacteria which can contaminate water supplies and cause sickness
- suspended solid matter
- detergents and other chemicals
- heavy metals
- trace minerals.

Wastewater treatment systems are normally designed to remove gross solids, stabilise degradable organic material and settle out stabilised solids as sludge. Disposal of treated wastewater may occur to the sewer (to standards set by the sewerage service provider) and, where receiving environment targets are met, via leach drains, soak wells, transpiration beds or irrigation systems.

Approval processes for on-site wastewater systems under the *Health Act 1911* ensure public health objectives are met. However, these approval processes must be complemented by other approval processes to ensure that comprehensive environmental objectives are met.

The main environmental issues associated with on-site effluent disposal systems are:

- nutrient and pathogen contributions to water resources including wetlands, watercourses and coastal waters
- the quality of public drinking water supplies.

As the densities of on-site effluent disposal systems increase in the catchments of wetlands, waterways and coastal waters, such systems are of highest concern where the predominant soils types are sandy soils with a low ability to retain phosphorus; clay soils with low infiltration rates; soils with a high water table and shallow soils.

Reticulated sewerage systems are generally the best way to deal with domestic wastewater in town and cities. Where unsewered developments are associated with a pollution risk, the typical solution is to retrofit sewerage. However, this can be expensive and disruptive for the community. On-site effluent disposal is considered to be a practical option for new development areas only where residential densities or the number of systems will remain low, and connection to reticulated sewerage is not feasible.

The main types of on-site effluent systems installed in Western Australia are as follows:

- septic tank and leach drain/soakwell systems. Although septic tank and leach drain/soakwell systems do not reduce nutrient levels, nutrient levels may be reduced in the soil depending on the soil and local environment conditions
- aerobic treatment units. Some but not all aerobic treatment units are approved by the Department of Health as phosphate removing systems
- septic tank and amended soil in the disposal field. The amended soil reduces phosphate levels, for example, the by-product from alumina processing known as red mud
- other systems that separately treat toilet waste (for example, composting toilets) and greywater (wastewater from the bathroom laundry and kitchen).

Each system has different ongoing management requirements, with aerobic treatment units typically involving more time and cost.

Some treatment systems are designed to reduce phosphorus levels but not nitrogen. In some instances (particularly in the catchments of inland wetlands and waterways), phosphorus control may be more crucial in preventing deterioration of aquatic ecosystems than the control of nitrogen (Gerritse 2002). However, in some coastal catchments (for example, the catchment of Cockburn Sound) the key nutrient of concern is nitrogen (D.A. Lord & Associates 2001).

In Western Australia, land use planning decision-makers influence environmental outcomes associated with on-site domestic effluent disposal by approving where new development occurs, lot sizes and development requirements. Decisions made during the land use planning process generally determine whether new development areas will be connected to a reticulated sewerage system or not.

Planning is assisted by the *Government Sewerage Policy–Perth Metropolitan Region* (Government of Western Australia 1996) and the *Draft Country Sewerage Policy* (Health Department of Western Australia et al 1999). These state government policies were prepared to facilitate the provision of sewerage services and to provide the minimum requirements for unsewered subdivision or development (such as maximum number of lots and minimum lot sizes). A revised country sewerage policy is in preparation at the time of publication of this guidance statement.

Advice is also available from the following agencies:

- Department of Health. The Department of Health has responsibilities under the *Health Act 1911* to approve on-site effluent disposal system types and provide advice generally on on-site effluent disposal systems
- Local government (environmental health). Application for approval to install a domestic wastewater treatment system must be made to the local government. Domestic wastewater treatment systems are controlled under the *Health Act 1911* and *Health (Treatment of Sewage and Disposal of Effluent and Liquid Waste) Regulations 1974*
- Department of Environment and Conservation (DEC). The DEC has a range of functions relating to the protection of the environment and water quality, and administers the pollution prevention provisions of the EP Act. While it does not regulate domestic wastewater treatment and disposal systems, it provides advice on the protection of the environment from impacts from wastewater disposal
- Department of Water. The department provides advice and recommendations on the protection of water resources from wastewater disposal however it does not regulate domestic wastewater or disposal systems.

It is preferred that new development is connected to sewerage. From an environmental perspective, on-site effluent disposal is considered to be a practical option for new development areas only where:

- residential densities or the number of systems will stay low, and connection to reticulated sewerage is not feasible
- effluent can be retained within lot boundaries
- buffers to water resources and conservation areas are maintained, and potential cumulative environmental impacts from on-site systems are able to meet the EPA's objectives
- management controls can be applied to assist in achieving environmental objectives.

When it is not intended to provide new low-density development areas with reticulated sewerage, to ensure an environmental outcome consistent with the EPA's objectives it is recommended that:

- in the case of development in public drinking water source areas, that development complies with the relevant statements of planning policy (see Table C1) and water quality protection notes issued by the Department of Water (see Chapter E)
- in the case of other development, that the environmental requirements in the *Draft Country Sewerage Policy* (Health Department of Western Australia et al 1999) are taken into account, and that sufficient site-specific studies are carried out early in the planning process to demonstrate that the development will be carried out in a way that is consistent with the environmental objectives and criteria for the receiving environment. Relevant information includes:
 - site conditions and the regional context
 - the ability to retain effluent on-site
 - information on nutrients and potential pollutants from all sources associated with the new development
 - water resources (groundwater, wetlands and waterways) and ecosystems downstream of the development and their significance
 - key management measures (see below) to be applied through planning and other processes, and how and when they will be applied.

It is recommended that management measures to ensure an acceptable environmental outcome take into account:

- the density of development and minimum lot sizes
- the specific location of building envelopes
- setbacks for on-site effluent disposal systems/building envelopes from environmentally sensitive areas
- other requirements to ensure on-site systems achieve the desired environmental objectives, for example, phosphorus removal (recognising that any requirements to meet general environmental protection objectives must be acceptable to other agencies that approve on-site effluent disposal systems).

Indicative guidelines for lot sizes and setbacks to protect the environment are in the *Draft Country Sewerage Policy* (Health Department of Western Australia et al 1999).

C3.4 REFERRAL TO THE EPA

Schemes and proposals referred to the EPA that are likely to have a significant impact on water resources may be required to undergo environmental impact assessment pursuant to the EP Act. General advice on the referral of schemes to the EPA is in A3.2.1, and advice on the referral of proposals is in A4.2.1. That general advice should be read in conjunction with the advice below.

C3.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

The main categories of proposals that may need to be referred to the EPA on the grounds of significant impacts on water quality or quantity are:

- major industries and infrastructure (for example, major wastewater treatment plants)
- major new dams, groundwater abstraction schemes, irrigation projects, aquaculture projects and intensive agriculture projects
- significant clearing of vegetation
- urban or other development likely to significantly change the catchment hydrology or contribute to the degradation of water resources (for example, eutrophication of waterways)
- proposals seeking authorisation for activities prohibited under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* or the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1997* (see below).

Referral by a decision-making authority of a proposal should be considered after the authority has obtained sufficient information on the site, the proposal and potential impacts, and after consulting with relevant agencies and experts, if:

- an agency with relevant environmental responsibilities has raised significant concerns
- these concerns are not likely to be addressed through decision-making processes
- discharges are likely to impact on ecosystems or water resources of key concern to the EPA (as indicated in Attachment A4-1).

The EPA does not typically expect that a proposal that will be implemented in a way acceptable to the DEC and relevant environmental agencies, or that will not be approved by a decision-making authority, will need to be referred. (Other exemptions are listed in A4.2.2.)

Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 and the Environmental Protection (South West Agricultural Zone Wetlands) Policy 1997

Referral of a proposal to the EPA is likely to be the appropriate procedure where an applicant seeks authorisation for activities prohibited under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* or the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1997* such as the following:

- a proposal involving the draining of water into or out of a lake protected by the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*
- the construction or alteration of prescribed drainage systems in the case of wetlands protected by the *Environmental Protection (South West Agricultural Zone Wetlands) Policy 1997*.

The EPA encourages referrals to be accompanied by the advice of the relevant environmental management agencies, for example, DEC.

C3.4.2 INFORMATION TO ACCOMPANY A REFERRAL

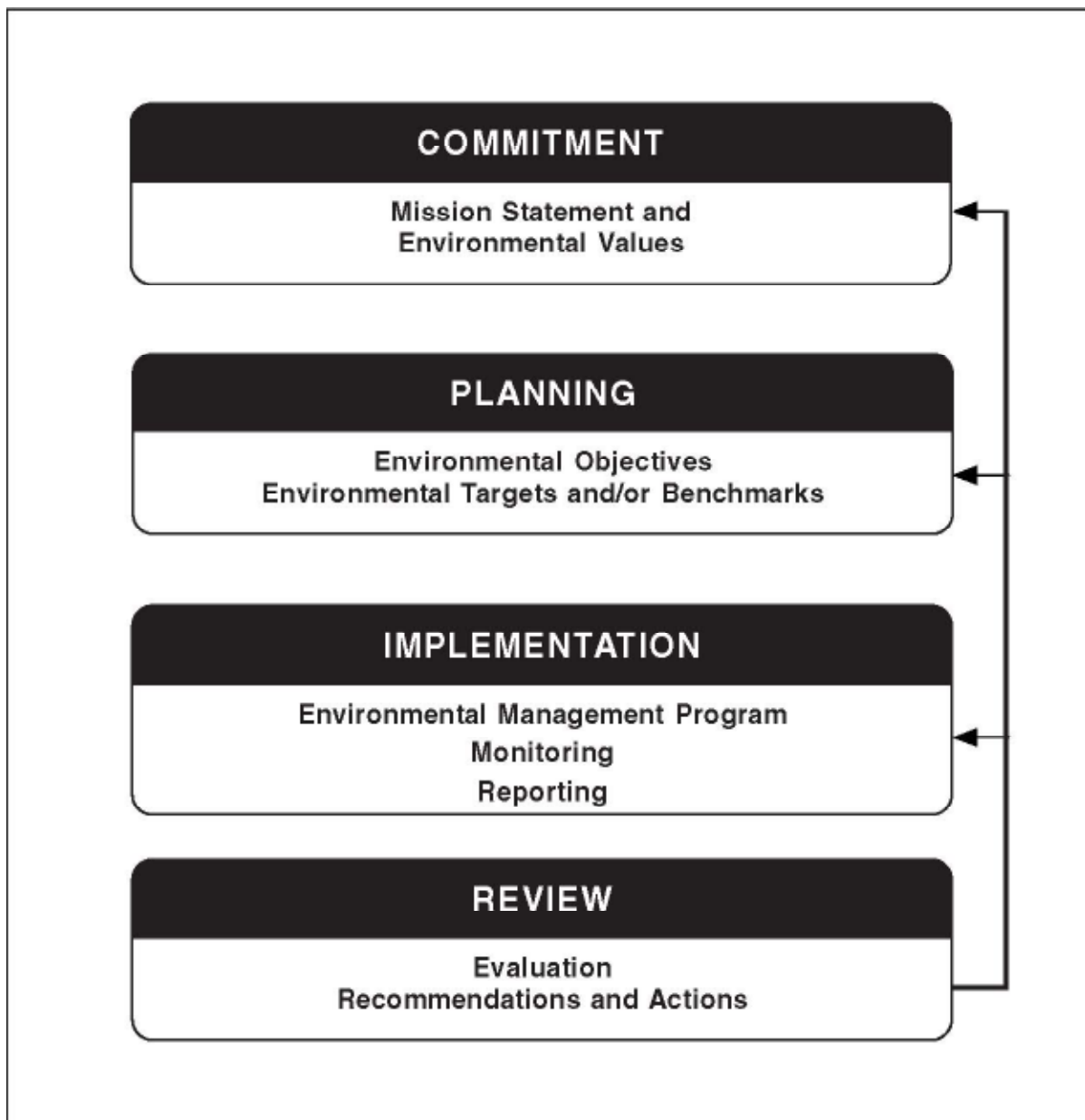
When a scheme or proposal is referred to the EPA and there is likely to be a significant impact on water quality or water quantity, information that assists the EPA to set the level of assessment includes:

- key aspects of activities that affect water quality and quantity, for example, characteristics of discharges to land and water, proposed source of water supply and quantity required
- characteristics of the receiving environment of relevance to the proposed activities, and the significance of the environment
- potential environmental impacts and their significance
- any studies that have been carried out, and an outline of proposed studies
- how impacts will be managed to meet recognised objectives and criteria
- comments from government agencies and experts
- a summary of public consultation carried out and proposed
- a list of all the approvals that are required.

The EPA may request further information if the information submitted is not sufficient for the EPA to decide whether to assess the scheme or proposal, or to set the level of assessment on a referred proposal. Where further information is required and where possible, please provide all relevant data in digital and GIS format.

Chapter C3-1

The Natural Resource Management Framework



The natural resource management framework provides an overarching process for committing to, planning, implementing and reviewing natural resource management (EPA 2005a).

Chapter C4

Noise and vibration

C4.1 BACKGROUND

It is generally acknowledged that excessive exposure to community and environmental noise can negatively impact people's health and well-being. However, the nature and extent of these impacts is not easily defined. The potential impacts of prolonged exposure to unacceptable noise are varied but can lead to loss of sleep, increased stress and annoyance, impaired work productivity and learning performance, and increased blood pressure and heart disease (World Health Organisation website www.who.int).

It has been estimated that more than 70% of environmental noise Australia-wide is due to road traffic (Department of Environment and Heritage 2001). In Western Australia, local governments and the Department of Environment and Conservation (DEC) deal with thousands of noise complaints each year. Interestingly, and contrary to popular belief, research has found that people do not become accustomed to excessive noise, although they may be less startled by an expected noise event (Department of Environment and Heritage 2001).

This chapter outlines some noise concepts, characteristics and issues, and sets out the position and advice of the Environmental Protection Authority (EPA) on the consideration and management of noise and vibration during planning.

C4.1.1 MEASURING SOUND

Sound is measured in **decibels (dB)**. The zero of the decibel scale for sound is the hearing threshold. Sounds at 0 dB to 10 dB are so quiet that they are difficult to hear, while sounds at the top end of the scale above 140 dB can cause instant permanent hearing damage.

The dB scale is logarithmic. Each 10 dB increase is perceived as a doubling of loudness. Thus 50 dB will sound twice as loud as 40 dB. The loudness of different sound levels is indicated in Attachment C4-1.

Noise levels are generally **A-weighted** to represent the way sound is perceived by the human ear, taking into account that people are not as sensitive to lower frequencies as they are to higher frequencies. An A-weighted sound level is described by the symbol dB(A).

C4.1.2 NOISE CHARACTERISTICS

Some of the characteristics of noise that can influence how a person responds to it include:

- the level of noise (its loudness)
- the frequency (pitch), that is, whether it is high or low
- how long the noise occurs for
- whether the noise is predictable
- tonal nature such as ringing or humming, or impulsive nature such as explosions
- the time of the day that the noise occurs
- the activities of the person affected
- the relationship between the person affected and the noise
- familiarity with the noise and its purpose
- fear of the noise
- the person's opinion of the source.

TERMS

Noise and vibration

Section 3 *Environmental Protection Act 1986* (EP Act) defines noise as 'vibration of any frequency, whether transmitted through air or any other physical medium'. The definition of noise in Western Australia thus includes audible frequencies, as well as frequencies below the audible range (infrasound) and above the audible range (ultrasound). It includes 'felt' vibration and vibration re-generated as noise. All these forms have the potential to adversely affect environmental values and the health, welfare and amenity of people. However, noise most commonly refers to unwanted or unpleasant sound. In this chapter, noise has this meaning unless otherwise stated.

Sound

Everything we hear is sound.

Noise-sensitive premises

The *Environmental Protection (Noise) Regulations 1997* (Noise Regulations) defines all premises other than commercial and industrial premises (including infrastructure) as noise-sensitive premises (see C4.1.3).

(Source: www.epa.sa.gov.au).

C4.1.3 NOISE-SENSITIVE PREMISES

The occupants of some premises are more sensitive to noise and vibration. The Noise Regulations defines all premises other than commercial or industrial premises as noise-sensitive premises. These include:

- premises occupied solely or mainly for residential or accommodation purposes
- rural premises
- caravan parks and camping grounds
- hospitals with less than 150 beds
- rehabilitation centres, care institutions
- educational centres
- premises used for public worship
- hotels and the like which provide accommodation for the public
- aged care and child care centres
- prisons and detention centres.

C4.1.4 ASSIGNED NOISE LEVELS

The maximum noise levels deemed acceptable pursuant to the Noise Regulations at noise-sensitive premises, commercial premises and industrial premises are called assigned noise levels. **Assigned noise levels** are reproduced in Attachment C4-2. Acceptable noise is identified in terms of the $L_{A\max}$, L_{A1} , and L_{A1} assigned levels, and takes into account influencing factors. These terms are defined in Attachment C4-2.

C4.1.5 NOISE ISSUES IN WESTERN AUSTRALIA

In Western Australia, common sources of noise complaints are as follows (DEC not dated):

- major roads and railways
- air traffic
- barking dogs and kennels
- recreational activities, such as music, parties and concerts
- alarms and sirens
- construction noise
- use of power tools in residential areas
- air conditioners
- commercial activities, such as hotels, restaurants, shopping centres and service stations
- industrial activities
- resource industries, such as quarry activities
- agricultural activities.

C4.2 EPA'S BROAD PRINCIPLES ON NOISE AND VIBRATION

EPA's objectives

- *to protect the amenity of the community from noise and vibration impacts associated with development or land use by ensuring that statutory requirements and acceptable standards are met*
- *to avoid unacceptable adverse impacts on the natural environment, including native fauna.*

Hierarchy for the management of noise and vibration

Activities that generate noise and vibration should be managed in accordance with the following order of preference:

- Avoid activities that create noise and vibration.
- Contain emissions within the individual land use site boundary.
- Manage emissions so that there are no unacceptable noise and vibration impacts on nearby land uses and the environment.

To manage noise emissions, the preferred treatment hierarchy is as follows: treat the source to eliminate or limit noise; treat the pathway between the source and the receiver (for example, build noise walls); and treat the receiver (for example, install double glazing in windows).

Noise and vibration at receiving premises

Noise and vibration at receiving premises should be managed to be as low as reasonably practicable, and to comply with statutory requirements and acceptable standards. Statutory requirements include the EP Act and the Noise Regulations.

In the case of a new major source of noise near an area identified for future sensitive land use, a process should be put in place to ensure that when the sensitive land use commences, noise levels will be at acceptable levels.

Incremental noise increases and cumulative noise should not result in unacceptable noise levels at nearby land uses.

Best practice and continuous improvement

Activities that generate noise should adopt the principles of best practice and continuous improvement. The EPA's concepts of best practice and continuous improvement are described in EPA (2003b) and EPA (2004a).

Informed decision-making

Where new development or land use has the potential to result in unacceptable noise, adequate information should be provided to enable informed decision-making.

C4.3 CONSIDERING NOISE AND VIBRATION DURING PLANNING

The land use planning system has a key role in protecting the amenity of the community from noise and vibration impacts through the designation of land use zones and approval of planning applications. This section provides advice to complement the broad principles above. First, general considerations and management measures applicable to broad scale planning and local area planning are addressed in C4.3.1 and C4.3.2. Advice on the types of information that help the evaluation of noise issues is in C4.3.3. Then, the following specific matters are addressed: operational noise from industry (C4.3.4), construction noise (C4.3.5), road and rail transport noise (C4.3.6), vibration (C4.3.7), aircraft noise (C4.3.8) and other issues (C4.3.9).

It is recommended that planning decision-makers are aware of the various statutory controls and agencies that regulate noise in particular situations, and the scope and limitations of regulatory mechanisms. Controls include the Noise Regulations administered by local government, and licensing under Part V of the EP Act by the DEC. Attachment C4-3 provides an introduction to the Noise Regulations, and indicates noise not covered by the Noise Regulations.

C4.3.1 BROAD SCALE PLANNING

The EPA recommends the identification of existing and potential key regional and local noise and vibration issues during the broad scale planning stages (that is, during strategic planning, the preparation of town planning schemes and region schemes, and planning for large sites). These stages present good opportunities for the consideration of:

- locations for new zones and transport corridors having regard for environmental factors that influence noise outcomes (for example, landform and local meteorological conditions)
- the type and timing of planning measures to be applied at the subsequent levels of planning to prevent land use conflicts (the use of buffers is discussed in C1.3.1).

When noise or vibration currently or potentially raises significant issues, evaluation of the issues is recommended during broad scale planning to enable an appropriate planning response. Acoustic studies and modelling are particularly appropriate when planning for, and near, major industries

and infrastructure, industrial areas and transport corridors (see C4.3.3 on noise reports). It is important to base any evaluation and modelling of impacts on realistic predicted sound power levels from noise-emitting activities.

Land use planning decision-makers should take into account that rezoning an area for residential development near existing noise-emitting premises may have implications for the operators of those premises, as they may be obliged to implement new noise management measures to remain in compliance with the Noise Regulations.

In areas where future noise-sensitive development will be conditional on the future implementation of noise amelioration measures (for example, new residential development near a major road or railway), responsibilities for the provision of noise amelioration measures should preferably be clarified early in the planning process.

Further general advice to assist in achieving acceptable environmental outcomes through broad scale planning is provided in A1.4.1.

C4.3.2 LOCAL AREA PLANNING

The advice in this section complements the general advice on protection of the environment during local area planning in A1.4.2.

When noise or vibration is likely to be an issue, it is recommended that planning decision-makers ensure that applicants provide appropriate information. An outline of information that can assist decision-making is in C4.3.3.

It is helpful for participants in planning to be aware of the main types of noise amelioration measures. Measures applicable to noise emissions and the protection of noise-sensitive premises are generally of three major types (Department of Environment and Heritage 2001):

1. limiting or eliminating noise at the source
2. providing barriers or separation between the source and receiver
3. insulating or treating the receiver.

Measures potentially applicable to noise-emitting premises are as follows:

- procure specific new equipment
- retrofit existing premises (for example, enclosures, noise walls, insulation)
- adjust site layout to create separation distances between noise sources and receivers
- manage operations or limit the use of equipment according to the time of day or weather conditions.

Noise treatments potentially applicable to existing noise receivers include:

- noise barriers/walls on receiving premises to ameliorate noise in outdoor living areas, for example, around patios
- thick or double-glazing on windows, solid walls and doors, window and door seals, relocation of sleeping areas away from noise sources.

Measures applicable to new noise receivers may also include:

- buffers/separation distances between noise sources and noise-sensitive development to be secured by scheme provisions
- plans to show building envelopes located beyond the designated separation distance
- notifications on title
- provision of suitably detailed information to prospective purchasers to allow them to make informed decisions on noise issues.

Sometimes a combination of measures is required to effectively treat noise exposure and meet the accepted guidelines.

It is recommended that planning decision-making on specific projects where noise is likely to be an issue takes into account as applicable:

- sources of noise, for example, construction, operational, transport
- the separation between noise sources and sensitive land uses
- the detailed site layout, and design and orientation of buildings (on the premises where noise is emitted and where noise is received)

- the scale and types of activities, plant processes, technologies and management procedures at noise sources
- realistic existing and future sound power levels at receiving premises, and other noise characteristics, for example, pitch and duration
- noise management measures that are practicable and enforceable.

Sometimes, as mentioned above, memorials are placed on land titles to alert prospective owners to the existence of noise. The EPA prefers that new land uses and developments are located to avoid the potential for unacceptable impacts from noise and other emissions.

For developments that require on-going management of noise, whether at the construction or operation stages, a condition requiring the preparation and implementation of a noise management plan may be appropriate. Standard elements of environmental management plans are listed in Attachment A1-2.

It is important to note that vegetation, such as a vegetated buffer, is not very effective in the treatment of noise, and should not be considered a noise management option.

At the time of publication of this guidance statement, amendments to the Noise Regulations are under consideration. These may provide useful tools in particular instances, for example, motor sports, shooting venues, major recreational venues.

C4.3.3 REPORTING ON NOISE

Information that assists decision-makers to evaluate noise issues is set out in the checklist below. When noise is an important issue, a comprehensive noise (acoustic) report should be prepared by a suitably qualified acoustic professional. When noise issues do not justify a full acoustic report, the items in the checklist should be considered and addressed as appropriate. The EPA's recommended technical methodology for assessing noise, other than transport noise, is set out in EPA Draft Guidance Statement No. 8 (EPA 2007c). The methodology is particularly useful for showing whether or not a project is likely to comply with the Noise Regulations.

CHECKLIST FOR NOISE REPORTS

- ☐ Describe the project.
- ☐ Identify all sources of noise, and the characteristics of each type of noise emission (see C4.1.2).
- ☐ Identify the location and the sensitivity of premises, public places and future land uses that may receive noise.
- ☐ Identify the stages when noise is likely to be an issue (for example, construction, operation).
- ☐ Identify background noise character (situations of special interest include low ambient noise areas, and areas experiencing noise from a range of sources).
- ☐ Identify relevant guidelines, policies, standards and statutory requirements, and propose particular objectives and criteria to be applied to the project.
- ☐ What consultation with the community and relevant agencies has been carried out, or is proposed?
- ☐ Identify whether the proposal is particularly sensitive in the community.
- ☐ Report the results of background noise measurements (include an explanation of technical terms).
- ☐ Predict future noise levels, carefully itemising all assumptions. Compare noise predictions against the noise criteria, and show the extent to which the Noise Regulations and acceptable standards are met.
- ☐ Demonstrate that a range of management measures have been considered with a view to reducing noise to as low as reasonably practicable.
- ☐ Identify preferred management measures, the noise reduction likely, and the reasons for the selected measures. Any deviation from recognised criteria or guidelines should be accompanied by adequate justification.

Decision-making authorities and the EPA may have additional information and methodology requirements, and if so, these should be addressed in the noise report. For major projects, a preliminary acoustic report may need to be supplemented by more detailed reports.

Some specific noise issues of relevance to planning are addressed in the following sections.

C4.3.4 OPERATIONAL NOISE FROM INDUSTRY

Operational noise from industry can create significant issues for people in nearby noise-sensitive premises such as residences, schools and hospitals. It can also cause problems for other nearby commercial and industrial premises. As a result, effective design of the planning interface between industry and other, more sensitive, land uses is critical to the creation of a sustainable noise environment, both for the industry and the noise-receivers. This is important when planning for new residential areas near existing industry, and also when planning for new industrial areas. Draft EPA Guidance Statement No. 8 (EPA 2007c) provides advice on the EPA's position in relation to noise assessment for both of these scenarios.

C4.3.5 CONSTRUCTION NOISE

Noise associated with construction activity has the potential to adversely affect the amenity of the community. The preparation and implementation of noise management plans for large scale construction projects is recommended. Under the Noise Regulations, local government is generally responsible for the regulation of construction noise. Draft EPA Guidance Statement No. 8 (EPA 2007c) provides relevant guidance on the assessment of construction noise.

C4.3.6 ROAD AND RAIL TRANSPORT NOISE

Although noise associated with road and rail transport is one of the most pervasive sources of noise in the community, it is also one of the most difficult to control. In view of the special characteristics that apply to road and rail transport noise, the issue has been specifically excluded from the Noise Regulations. The EPA is conscious, however, that there is a need for consistent road and rail transport noise criteria that could be used for land use planning and environmental impact assessment.

The EPA supports the development of a State Planning Policy (SPP) for road and rail transport noise, and notes that the draft SPP released in 2005 (WAPC 2005c) is in the process of finalisation. In the interim, the EPA's position is that it will refer to the draft SPP (WAPC 2005c) when assessing planning proposals involving new or upgraded road or rail infrastructure, or new noise-sensitive developments adjacent to major roads or railways. It should be noted that the EPA will take an 'as low as reasonably practicable' approach when assessing planning proposals involving road or rail noise impacts.

In planning situations involving new or upgraded road or rail infrastructure, or new noise-sensitive developments adjacent to major roads and railways, the following resources provide guidance:

- recent EPA assessments
- State Planning Policy: Road and Rail Transport Noise (Draft) (WAPC 2005c)
- Road and Rail Transportation Noise (DEP 2000c) – the EPA will refer to this document when assessing noise impacts from proposals that will cause an increase in traffic on an existing road or railway
- current research on the potential sleep disturbance and health impacts of transport noise (enHealth Council 2004)
- AS/NZS 2107:2000 Acoustics - Recommended Design Sound Levels and Reverberation Times for Building Interiors.

Previous assessments by the EPA of proposals involving road and rail noise impacts have established the following principles:

- Special consideration is needed in areas where the ambient noise level is relatively low.
- In the case of a proposal involving an existing road or railway that is likely to cause a significant increase in noise, the proponent should assess likely noise impacts and identify potential solutions.
- 'As low as reasonably practicable' considerations should be based on the costs and benefits of noise reduction measures, and their acceptance within the community.

Roads

The noise of road vehicles is mainly generated from the engine, braking systems and frictional contact between the vehicle, the ground and the air. Special problems can arise where there is a change in engine speed and power such as at traffic lights, traffic calming devices, hills and intersecting roads, and especially where the road is used by heavy vehicles. Changes to road surfaces and barrier walls or bunds can be considered for road traffic noise management. On bridges and in tunnels, vibration and regenerated noise may result from vehicles passing over road joints. (Regenerated noise is the noise that is radiated into a room by the floor, walls and ceiling vibrating in response to vibrations in the ground.)

When the noise from a new road cannot be managed within the road reserve, noise amelioration measures at individual noise-sensitive premises should be considered, such as installing thick or double glazed windows, solid walls and doors, and window and door seals.

Useful non-statutory guidance is provided in AS 3671-1989 *Acoustics-Road Traffic Noise Intrusion – Building Siting and Construction*.

Rail (passenger and freight)

Rail noise primarily depends on the speed of the train. It is also influenced by the type of engine, wagons, rails and wheels. Variations and curves in the track can also lead to high levels of high frequency noise referred to as wheel squeal. Noise can be generated in stations where engines are left running and the overall noise impact is increased with the addition of whistles, loud speakers, warning sounds and in marshalling yards because of shunting. Sinking railways, grinding rails, isolating track sections, erecting noise barriers, specifying quieter engines when purchasing new rolling stock, and reducing speeds in residential areas are measures that can be considered to manage noise impacts from rail usage. Vibration and regenerated noise may be relevant considerations along rail routes, particularly near cuttings and tunnels.

Again, when noise from a new rail service cannot be managed within the rail reserve, the implementation of noise amelioration measures at individual noise-sensitive premises should be considered.

C4.3.7 VIBRATION

Vibration is a common source of concern near existing mining and quarrying activities (from blasting), major construction works (piling and compaction), railways and some industries, for example, commercial laundries. Occupants of buildings may feel annoyed and concerned at possible damage to the building. While vibration at high levels may indeed cause building damage, the EPA does not assess this as an environmental issue. The EPA's objective is to ensure that vibration is managed to within acceptable levels for human annoyance. The criteria are more stringent than those for building damage. Assessments are conducted on a case-by-case basis. AS 2670.2-1990 *Evaluation of Human Exposure to Whole-body Vibration - Continuous and Shock-induced Vibration in Buildings* (1 to 80 Hz) does, however, provide a context in which to consider environmental vibration impacts, and is taken into account by the EPA. (see also EPA Draft Guidance Statement No. 8).

The EPA notes that the DEC no longer sets blast vibration conditions on licensed premises. Where blasting is likely to be an issue, reference should be made to the guidance material and vibration criteria in Draft EPA Guidance Statement No. 8. (EPA, 2007c)

C4.3.8 AIRCRAFT NOISE

Aircraft operations generate substantial noise near commercial, regional and military airports and helipads. Noise impacts are associated with take-offs and landings, training flights (especially circuits), overflights at low altitude and ground running of jet aircraft for testing purposes.

It is expected that development near Perth Airport will be considered in accordance with State Planning Policy No. 5.1: *Land Use Planning in the Vicinity of Perth Airport* (Government of Western Australia 2004a). This document provides policy measures for areas near Perth Airport based on the noise exposure zone on the official Australian Noise Exposure Forecast (ANEF) 350,000 contour plan. The ANEF is an annualised average noise indicator that can be used to predict areas of land most likely to be influenced by 'unacceptable' or 'conditional' noise impacts. Development around Jandakot Airport will be considered in accordance with State Planning Policy No. 5.3: *Jandakot Airport Vicinity* (Western Australia Planning Commission 2006)

While ANEFs are particularly useful tools around major city airports, they have limited application for regional and special purpose airports and helipads. In these cases, the particular air traffic characteristics should be taken into account to assist in the determination of acceptable separation distances between noise-sensitive premises and the airport (Department of Transport and Regional Services 2003). With regard to proposals for new and upgraded regional airports, the EPA expects that the proponent will submit a detailed assessment of the predicted noise impacts of all likely aircraft operations, together with a comprehensive draft Noise Management Plan addressing the proposed management of the noise emissions and the related land use planning policy.

C4.3.9 OTHER ISSUES

Examples of other land uses and activities where careful detailed planning will help provide protection from unacceptable noise impacts are listed below. Examples of specific sources of noise complaints are shown in brackets.

- shopping centres (loading bays, refrigeration plant)
- residential areas (air conditioning units, pool pumps)
- major recreational and entertainment venues (motor sports) • orchards and vineyards (bird scarers)
- 24-hour service stations and car wash facilities
- fringe residential areas (trail bikes, caged birds)
- dog kennels
- areas subject to cumulative noise from a number of sources (areas near industrial estates).

C4.4 REFERRAL TO THE EPA

Some schemes and proposals that must be referred to the EPA pursuant to the EP Act are assessed on grounds that include noise and vibration impacts. These include schemes and proposals for the following land uses:

- major roads
- major new railways
- airports
- major industries
- ports.

Some major sporting complexes and recreational venues have also been subject to environmental impact assessment by the EPA.

General advice on referring schemes and proposals to the EPA is set out in A3.2.1 (referral of schemes) and A4.2.1 (referral of proposals) and should be read in conjunction with the advice below.

C4.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

Referral of a proposal by a decision-making authority to the EPA on the grounds of noise or vibration should be considered in the case of a major development with the potential to cause off-site noise or vibration impacts that do not meet statutory requirements and acceptable standards. Relevant requirements and standards include but are not limited to the Noise Regulations, State Planning Policy No. 5.1: *Land Use Planning in the Vicinity of Perth Airport* (Government of Western Australia 2004a), State Planning Policy No. 5.3: *Jandakot Airport Vicinity* (Western Australia Planning Commission 2006) and State Planning Policy: *Road and Transport Noise* (Draft) (WAPC 2005c).

C4.4.2 INFORMATION TO ACCOMPANY A REFERRAL

When a scheme or proposal is referred to the EPA, and noise or vibration is likely to be a significant issue, sufficient information should be provided to demonstrate whether or not potential noise and vibration impacts would unreasonably interfere with people's health, welfare, convenience, comfort or amenity. In some special instances, information addressing the potential for noise or vibration impacts on significant elements of the environment (for example, fauna) may be relevant.

In the case of the referral of a scheme or proposal where noise is likely to be an issue, the EPA expects that the procedures described in Draft EPA Guidance Statement No. 8 – *Environmental Noise* (EPA 2007c) will be applied. It should be noted that the draft Guidance applies to proposals which come under the noise regulations and to proposals that are required to meet other acceptable standards, but does not apply to transport-related noise issues

The EPA may request further information if the information submitted is not sufficient for the EPA to decide whether or not to assess the scheme or proposal, or the level of assessment in the case of a proposal. Where further information is required and where possible, please provide all relevant data in digital and GIS format.

Attachment C4-1

Typical sounds and their loudness

Noise Level dB(A)	How you would hear these sounds
75-80	Trucks passing in the street Chainsaw nearby Burglar alarm next door
70-75	
65-70	Dog barking or leaf blower operating next door Rock concert on oval nearby Light plane passing overhead
60-65	
55-60	Highway traffic Lawnmower or electric drill operating next door Light aircraft in the distance
50-55	
45-50	Busy local traffic Strong wind in the trees Noisy air conditioner next door
40-45	
35-40	Distant suburban traffic Light wind in the trees Quiet air conditioner next door
30-35	
25-30	Rural area at night Light wind in the grass Far distant traffic

Attachment C4-2

Assigned noise levels

(from Table 1 *Environmental Protection (Noise) Regulations 1997**)

Type of premises receiving noise	Time of day	Assigned level (dB)		
		$L_{A\ 10}$	$L_{A\ 1}$	$L_{A\ max}$
Noise-sensitive premises at locations within 15 m of a building directly associated with a noise-sensitive use	0700 to 1900 hours Monday to Saturday	45 + influencing factor	55 + influencing factor	65 + influencing factor
	0900 to 1900 hours Sunday and public holidays	40 + influencing factor	50 + influencing factor	65 + influencing factor
	1900 to 2200 hours all days	40 + influencing factor	50 + influencing factor	55 + influencing factor
	2200 hours on any day to 0700 Monday to Saturday and 0900 hours Sunday and public holidays	35 + influencing factor	45 + influencing factor	55 + influencing factor
Noise-sensitive premises at location further than 15 m from a building directly associated with a noise-sensitive use	All hours	60	75	80
Commercial premises	All hours	60	75	80
Industrial and utility premises	All hours	65	80	90

$L_{A\ max}$ assigned level means a noise level which is not to be exceeded at any time.

$L_{A\ 1}$ assigned level means a noise level which is not to be exceeded for more than 1% of the time, that is, for more than one minute in 100 minutes.

$L_{A\ 10}$ assigned level means a noise level which is not to be exceeded for more than 10% of the time, that is, for more than ten minutes in 100 minutes.

The **influencing factor** takes into account the amount of industrial and commercial land and the presence of major roads within a 450 m radius around the noise-sensitive receiver. The Environmental Protection (Noise) Regulations 1997 set out how to calculate this and provide a worked example.

* The reader should refer to the legislation. No warranty is given as to the accuracy or completeness of information in this guidance statement.

Attachment C4-3

Introduction to the *Environmental Protection (Noise) Regulations 1997*

The *Environmental Protection (Noise) Regulations 1997* (Noise Regulations) were developed to regulate noise* emissions. Where noise emissions exceed the prescribed standard they can be regarded as 'unreasonable' under Part V *Environmental Protection Act 1986* (EP Act), and be an offence. The Noise Regulations set out procedures and criteria for noise assessment and control. The assigned noise levels recognise Australian and International Standards.

The Noise Regulations deal with all noise passing from one premises to another including from one unit to another in a block of units, and noise from public places as it affects adjacent premises. They also provide for special case scenarios such as noise associated with blasting, construction, agricultural activities, community activities, outdoor concerts, bellringing, calls to worship and equipment used on residential premises. The assessment of noise levels can be undertaken by two methods – by measurements of the sounds levels, or subjectively by ear by a police officer or authorised person.

The Noise Regulations set out **assigned noise levels** (the highest noise levels that can be received) for different categories of premises, and an assessment methodology for determining whether assigned levels are met. Assigned noise levels for noise-sensitive premises are lower at night than during the day. Assessment of noise levels takes into account annoying noise character in terms of tonality, modulation and impulsiveness. The assigned noise levels for all premises are indicated in Attachment C4-2.

It should be noted that the Noise Regulations do not deal with:

- noise within one premises, for example, within a workplace
- noise from traffic on roads and railways
- noise from aircraft (except model planes)
- noise from emergency vehicles
- noise from safety warning devices, where it is not practicable for the safe working system to comply.

Regulation of the above emissions depends on other statutory requirements. Depending on the circumstances, these may include land use planning processes and environmental impact assessment. Major new highway and airport projects are typically assessed by the EPA.

A useful summary of the Noise Regulations is available (DEP 1997a).

* In this attachment 'noise' includes 'vibration'.

Chapter C5

Light, radiation and electromagnetic fields

This chapter provides the advice of the Environmental Protection Authority (EPA) on some issues to do with radiation and electromagnetic fields that have been raised during environmental impact assessment.

C5.1 LIGHT SPILL

EPA's objective for light spill

To avoid or manage potential impacts from light spill and comply with acceptable standards.

C5.1.1 LIGHT SPILL AND PUBLIC AMENITY

Light spill can be distracting and annoying and can affect sleep, particularly when the light source is bright. Sources of nuisance light can include security lighting, lighting at sports venues and lighting at public facilities, for example, train stations.

The EPA expects that the relevant approval processes for a project (for example, planning, building and other local government approval processes) will ensure that lighting is designed to avoid adverse impacts on neighbouring land uses. Where approval processes can fully and publicly address issues, the EPA expects that proposals would rarely need to be referred to the EPA on the basis of significant light spill affecting public amenity.

Guidance for outdoor lighting is provided in the Australian Standard AS 4282-1997 *Control of the Obtrusive Effects of Outdoor Lighting* which recommends levels of light that may be considered acceptable for various surrounding land uses. Guidance can also be found in AS 2560.1-2002 *Sports Lighting – General Principles*, the AS 2560.2 series *Sports Lighting - Specific Recommendations*, and the AS/NZS 1158 series *Road Lighting*.

C5.1.2 LIGHT SPILL AND FAUNA AND FLORA

Sources of light can adversely affect a range of fauna, including insects, mammals and birds, and the growth and development of flora. For example, light spillage from coastal developments near sea turtle nesting grounds has been found to disturb nesting female sea turtles and to affect the sea-finding behaviour of turtle hatchlings (EPA 2002f). Also, ecological communities in caves can be impacted by artificial light as a result of recreational uses or scientific study.

Where a new project has the potential to cause light spill and affect the conservation estate or significant vegetation, flora or fauna, the EPA recommends that applicants and the relevant regulatory authorities ensure adequate biological surveys and assessment of impacts are carried out. This process should include consultation with relevant agencies and experts. Where it can be demonstrated that adverse impacts from light spill on valued flora and fauna can be avoided, any approval should be supported by appropriate plans and enforceable conditions.

Where the decision-making authorities are not likely to manage potentially significant environmental impacts from light spill (possibly because of restrictions on what can be taken into account or the conditions that can be set), referral of the proposal to the EPA should be considered. General guidance on when referral of a proposal should be made is in A4.2.1.

TERMS

Radiation is outlined in *Radiation Safety* (Operators' Radiation Committee 1998) as follows:

'Radiation is energy that travels through space, in the form of particles or electromagnetic waves. Light from the sun is a form of radiation, X-rays used in medicine are another. The word "radiation" refers to many forms of energy such as light, heat, radio waves, microwaves, X-rays and radar. Radiation is also the general name given to the kind of energy given off by radioactive atoms such as uranium and thorium. This type of radiation is called ionizing radiation because it has enough energy to remove electrons from atoms.'

Electromagnetic fields (EMFs) differ from radiation. They are described in *Powerlines, Electromagnetic Fields and Health* (Health Department of Western Australia 1997) as follows:

'An EMF has two components: an electric field and a magnetic field. An electric field exists when two objects have a voltage difference between them. For example, there is an electric field between a power line and the ground below because the power line is at a large voltage relative to the ground. A magnetic field exists when electric current flows through a wire. Thus magnetic fields surround the power lines conducting current from the power station to our homes. Normally, both electric and magnetic fields are present, so we can use the term EMF to mean either.'

C5.2 RADIATION

EPA's objective for radiation

To ensure that radiological impacts to the public and the environment are kept as low as reasonably achievable and comply with acceptable standards (EPA 2004g).

The main radiation issue raised during the environmental impact assessment process in Western Australia is the management of radiation associated with some mining industries, for example, the mineral sands industry. Radiation can be a relevant consideration at the mining, transportation, processing, storage, waste disposal and decommissioning stages.

The EPA takes into account that specific legislation and procedures apply to protect the safety of workers and the public. The main Western Australian government agencies involved in administering the legislation are the Department of Industry and Resources (DoIR) (in the case of the mining industry) and the Health Department of Western Australia. The Australian Radiation Protection and Nuclear Safety Agency administers Commonwealth legislation and also provides guidance to protect the health and safety of people and to protect the environment from ionizing and non-ionizing radiation.

Relevant legislation includes:

- Western Australian *Mines Safety and Inspection Regulations 1995*
- Western Australian *Radiation Safety Act 1975*
- Western Australian *Radiation Safety (General) Regulations 1983*
- Western Australian *Radiation Safety (Qualifications) Regulations 1980*
- Western Australian *Radiation Safety (Transport of Radioactive Substances) Regulations 1991*
- Commonwealth Australian *Radiation Protection and Nuclear Safety Act 1998*
- Western Australian *Environmental Protection (Controlled Waste) Regulations 2001*
- Western Australian *Nuclear Waste Storage and Transportation (Prohibition) Act 1999*.

The Mines Safety and Inspection Regulations 1995 require measures to be taken to control the exposure of employees and members of the public to radiation at or from the mine. Measures include the preparation of a radiation management plan.

The EPA expects that applicants and authorities making decisions on projects where radiation may be a relevant issue will consult with the agencies with key responsibilities for managing and advising on radiation issues to develop acceptable outcomes.

Where a proposal raises a major environmental issue for the state, referral to the EPA should be considered.

C5.3 POWERLINE ELECTROMAGNETIC FIELDS

During the environmental impact assessment process, the issue of electromagnetic fields around Western Power Corporation high voltage transmission lines has arisen. In the assessments carried out by the EPA, the EPA has accepted that its objectives are met where powerlines are designed and operated in compliance with the guidelines for human exposure to power frequency EMFs developed by the International Commission on Non-Ionizing Radiation Protection and recommended by the World Health Organisation. These guidelines have been endorsed by the National Health and Medical Research Council of Australia. They have also been adopted for use in Western Australia by the Health Department and Western Power.

C5.4 TELECOMMUNICATION FACILITIES

With respect to electromagnetic radio emissions from telecommunication facilities, the EPA considers its objectives are met because all carriers are required to comply with *Radiocommunications (Electromagnetic Radiation – Human Exposure) Standard* (Australian Communications Authority 2003). The limits incorporate safety margins to address concerns for potentially sensitive groups in the community such as children, pregnant women, the infirm and aged (Government of Western Australia 2004b).

Chapter C6

Contaminated sites

C6.1 BACKGROUND

Land and groundwater contamination is a serious problem in parts of Western Australia. The State of the Environment Report (Government of Western Australia 1998a) puts land contamination in the second highest category of environmental issues requiring government and community action in Western Australia.

TERMS

In Western Australia the term **contaminated** is defined in the *Contaminated Sites Act 2003* as follows:

'... in relation to land, water or a site, means having a substance present in or on that land, water or site at above background concentrations that presents or has the potential to present, a risk of harm to human health, the environment or any environmental value.'

Over the past decade there has been an increasing recognition of the problems associated with contaminated sites. The issue is of special importance in Western Australia because of our great reliance on groundwater and the threat posed by land contamination to groundwater quality.

Impacts on public health from contaminated sites can occur as a result of exposure via pollution of surface water and groundwater, uptake and subsequent bioaccumulation of pollutants by plants and animals, inhalation of vapours and ingestion and dermal contact with contaminated soil.

Impacts on the environment occur as a result of direct uptake of contaminants by plants and animals and the migration of contaminants to ground or surface waters.

Certain contaminants can also have a detrimental impact on the integrity of building and service structures.

The risk to people and the environment depends upon the type, extent and degree of contamination, the location and physical characteristics of the site (for example, soil type and depth to groundwater) and the specific use of the land and groundwater.

The report of the Department of Environment and Conservation's (DEC), Contaminated Sites Management Series guideline *Potentially Contaminating Activities, Industries and Landuses* (DoE 2004e), indicates the type of activities which can contaminate the environment, and identifies some of the potential contaminants for specific industries, activities and land uses.

Examples of sites where the issue of contamination should be considered during planning are:

- previous industrial sites, commercial sites, market gardens, railway yards, power stations, petrol
- station sites and fuel storage sites
- old land fill sites
- sites containing fill from an unknown source.

In recognition of the need for legislation in Western Australia to provide a framework for contaminated sites assessment and management, the *Contaminated Sites Act 2003* was assented to in November 2003 and took effect on 1 December 2006.

The Act provides for the identification, recording, management and remediation of contaminated sites in Western Australia. Major reforms contained in the Act include:

- requirements for owners, occupiers and people who caused contamination and contaminated sites auditors to report known or suspected contaminated sites to the DEC
- a system for classifying sites reported to the DEC, based on the risk each site poses to the environment and human health
- the creation of a free public database of confirmed contaminated sites and public access to a summary of information
- requirements for owners of sites classified as 'contaminated' or 'restricted use' to inform purchasers, lessees and/or mortgagees of land about any contamination present
- new enforcement powers, including investigation, clean up and hazard abatement notices
- clear rules for assigning responsibility for remediating contaminated sites.

The planning system will continue to have a significant role in the management of contaminated sites issues through its ability to consider and manage land use change.

Management of land uses to prevent land and water contamination is addressed in Chapter B7 Land degradation, Chapter C1 Pollution management, Chapter C3 Water management and Chapter C7 Waste management.

C6.2 EPA'S BROAD PRINCIPLES FOR CONTAMINATED SITES

EPA's objective

To ensure that remediation of site contamination achieves an acceptable standard that protects the environment, is compatible with the intended land use, and is consistent with appropriate criteria.

The EPA recommends that the following broad principles are applied to the issue of contaminated sites:

- Avoid creating new contaminated sites.
- Give priority to the investigation and clean-up of sites known to be a public health or environmental risk.
- Before subdivision or a change in the use of a contaminated site, the site should be remediated or managed in accordance with recognised practice and criteria for the protection of the environment and intended land uses. Guidelines include the DEC Contaminated Sites Management Series (see E3.3 and www.dec.wa.gov.au/contaminatedsites).

When site remediation is necessary, the contaminated material should be treated and/or disposed of in a manner which does not pose a risk to human health or the environment. Contaminated material should preferably be treated on-site and the contaminants reduced to acceptable levels, or treated off-site and returned for reuse after the contaminants have been reduced to acceptable levels.

Disposal of contaminated material to an approved waste disposal facility or landfill, or 'cap and contain' management options, should only be considered if:

- treatment of the contaminated material is not practicable
- disposal to landfill or 'cap and contain' is carried out in an environmentally acceptable manner
- the risks arising from disturbance of the contaminant exceed the risks of leaving it undisturbed and contained on the site (only relates to on-site containment).

Post-remediation validation should be carried out before further site disturbance occurs to ensure that remediation objectives and criteria have been met.

The broad methods of remediation preferred by the EPA are discussed in EPA Guidance Statement No. 17 *Guidance Statement for Remediation Hierarchy for Contaminated Land* (EPA 2000f).

C6.3 CONSIDERING CONTAMINATED SITES DURING PLANNING

Planning has a key role in ensuring that site contamination issues are identified and satisfactorily addressed prior to changes in land use, development and subdivision. The EPA expects that planning processes will require that potentially contaminated sites are investigated and remediated to meet acceptable standards before new development or changes in zoning and land use. In some instances, management requirements will be determined through the environmental impact assessment process under the *Environmental Protection Act 1986* (EP Act). However, environmental impact assessment is usually limited to sites with major contamination. Advice on the referral of schemes and proposals to the EPA for a decision on whether environmental impact assessment will be required is in C6.4.

Detailed advice to assist participants in planning processes is provided in *Contaminated Sites and the Landuse Planning Process: Draft for Comment* (E3.3) in the DEC's Contaminated Sites Management Series.

The EPA notes that better environmental outcomes consistently result from the early identification of contamination issues during planning. Early identification of site contamination issues can:

- reduce the likelihood of poor land use decisions and their legal and other consequences
- minimise risk to human health and the environment
- improve the timely processing of applications.

Suggested considerations at each stage of planning are outlined below. More detailed advice is provided in DEC (2006).

C6.3.1 BROAD SCALE PLANNING

During the strategic stages of planning, it is recommended that known and suspected contaminated sites are identified. A list of potentially contaminating activities and land uses is in DoE (2004e). In particular, any major sites should be identified together with the possible area affected by contamination. Any limitations on known information should be acknowledged.

Examples of potential contamination issues include new residential development in areas of unapproved fill, and on former market gardens.

Stringent procedures should be put in place to ensure that contamination issues will be appropriately addressed at each stage of planning. Open, transparent and adequate community consultation and dialogue at each stage of planning is urged to ensure that sensitive contamination issues are adequately addressed.

Further general advice to ensure environmental issues are fully considered during broad scale planning is in A1.4.1.

C6.3.2 LOCAL AREA PLANNING

Prior to decision-making on a rezoning, subdivision or planning application, the potential for site contamination should be considered. A list of potentially contaminating activities, industries and land uses is in DoE (2004e). For sites known or suspected to be contaminated, applicants should carry out investigations to provide information on the likely level of contamination and determine whether remediation will be required to make the site suitable for the intended land use. Site investigations should be in accordance with the DEC's Contaminated Site Management Series (see E3.3). Any limitations on known information should be acknowledged and taken into account during decision-making.

When approval of a scheme or planning application is proposed and site contamination is an issue, the EPA recommends that enforceable requirements are imposed through scheme provisions and/or approval conditions to protect human health and the environment. Conditions should ensure adequate site investigation, remediation and validation of remediation, consistent with the staged approach outlined in C6.3.3. An example of a condition requiring investigation for land and groundwater contamination, remediation and validation of remediation is in Appendix 2 DEC (2006).

It is important to ensure that any imported fill material on development sites is clean fill. Old fill material may require investigation and remediation. Any new fill material that is brought in to achieve the final contours of the subdivision or development site must be clean. The DEC has criteria for clean fill. A condition to ensure these criteria are met may be appropriate.

General advice to ensure environmental issues are fully considered during local area planning is in A1.4.2.

C6.3.3 SITE INVESTIGATION, REMEDIATION AND VALIDATION

It is recommended that before any potentially contaminated site is disturbed, site investigations are completed in accordance with the following staged approach (see the DEC's Contaminated Site Management Series in E3.3 or www.dec.wa.gov.au/contaminatedsites).

Stage 1 – Preliminary site investigation

This stage of investigation and reporting includes a desktop study, a detailed site inspection and, where appropriate, limited sampling to determine whether contamination is present or likely to be present and to determine whether a detailed site investigation should be conducted.

Stage 2 – Detailed site investigation

This stage involves the collection of comprehensive data on the issues identified in the preliminary investigations and includes sampling, analysis and risk assessment, and reporting on these.

Stage 3 – Site management plan

This stage documents the type and extent of remediation required to ensure that the site is suitable for its intended future use and that the surrounding environment and land uses are protected, and involves the implementation of the Site Management Plan.

Stage 4 – Post-remediation validation

This is the process of demonstrating that a contaminated site has been successfully remediated and that the objectives of the site management plan have been achieved. This step is to assess success of the remediation and often includes a plan for ongoing monitoring to avoid problems associated with contamination rebound.

Adequate reporting on each stage is important. Guidelines are set out in *Reporting of Site Assessments* (DEP 2001).

C6.4 REFERRAL TO THE EPA

Referral to the EPA of a proposal on a site that is subject to major contamination is generally expected.

However, in the first instance, before a decision-making authority or responsible authority refers to the EPA either a scheme or proposal involving contamination, it is recommended that the authority requests initial site investigations and seeks the advice of the DEC and/or relevant experts on technical issues. In most instances contamination can be managed by planning approval processes through enforceable conditions. Advice can be obtained from DEC or relevant experts on whether remediation to meet the appropriate standards may present special difficulties. Where expert advice points to the existence of major contamination or complex management issues, referral of a proposal to the EPA should be considered.

More advice on the referral of schemes and proposals to the EPA is set out in A3.2.1 and A4.2.1.

C6.4.1 INFORMATION TO ACCOMPANY A REFERRAL

When a scheme or proposal is referred to the EPA and the issue of site contamination has the potential to influence the level of assessment, information that assists the EPA to process the referral includes:

- former land uses and activities carried out on the site
- details of the proposed uses on the site, and likely future uses
- a preliminary investigation for contamination (completed in accordance with the DEC guidelines for site investigations)
- where contamination is found to exist, identification of any additional investigations, actions and reports carried out or proposed
- the comments of relevant authorities including the DEC, and the results of any consultation with the public
- proposed management measures, including proposed enforceable requirements.

The EPA Service Unit will review any information submitted. If it is not sufficient for the EPA to decide the level of assessment of the proposal or whether to assess the scheme, additional information may be requested. Where further information is required and where possible, please provide all relevant data in digital and GIS format.

Chapter C7

Waste management

C7.1 BACKGROUND

The main types of waste streams identified for Western Australia are inert (for example, sand, rubble), organic (compostable material), dry recyclable (for example, paper, plastic), general municipal, problematic (for example, tyres, electrical), and controlled (hazardous) wastes.

Waste generation, transport and disposal raise significant environmental issues for Western Australia. These include but are not limited to:

- contamination of soil and groundwater at industrial, landfill and other sites
- adverse impacts on water resources and ecological communities
- odour and other air emissions.

In 1995 the Select Committee on Recycling and Waste Management recommended that no new landfill sites be established on the coastal sand plain because of their potential to pollute groundwater. In addition, major changes were recommended to improve the operation of landfills to protect the environment and communities located close to these sites.

The general thrust of waste management in Western Australia is now towards:

- avoiding or minimising the generation of waste
- resource stewardship (taking responsibility for careful use of resources)
- adopting an **industrial ecology** approach which integrates ecological and engineering principles to minimise environmental impacts while not wasting resources and energy
- recovering resources from waste
- treating, separating and managing residues as close to the point of generation as possible.

This chapter provides the position and advice of the Environmental Protection Authority (EPA) on solid waste management to assist participants in land use planning and development to protect the environment. Wastewater management is addressed in Chapter C3, and land and groundwater contamination is addressed in Chapter C6.

C7.2 EPA'S BROAD PRINCIPLES FOR WASTE MANAGEMENT

EPA's objectives for waste management

- *to maintain the integrity, ecological function and values of the environment*
- *to ensure that emissions do not adversely affect the health, welfare and amenity of people and land uses.*

The following principles underpin the EPA's objectives for waste management.

Waste hierarchy

Wastes should be managed according to the following hierarchy of preference (EPA 2004a):

1. avoidance
2. reuse
3. recycling
4. recovery of energy
5. treatment
6. containment
7. disposal.

Waste minimisation

All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment (*s4A Environmental Protection Act 1986*).

Additional key principles that apply to all environmental issues are set out in *s4A Environmental Protection Act 1986* (EPA Act) and EPA Position Statement No. 7 *Principles of Environmental Protection* (EPA 2004a). These include the principles of best practice and continuous improvement.

C7.3 CONSIDERING WASTE MANAGEMENT DURING PLANNING

Actions during broad scale and local area planning that help meet the EPA's objectives for waste management are outlined in this section.

C7.3.1 BROAD SCALE PLANNING

Recommended actions applicable to strategic planning and the preparation of planning schemes:

- Identify strategic waste management issues (existing and potential) for the region, and the extent to which they may be addressed by planning decisions to complement other processes. Issues may concern the generation of different types of wastes by existing and proposed land uses, waste processing, the transport of wastes and their disposal. An example of a specific issue relevant to land use planning is the availability of suitably zoned land to accommodate new waste processing/transfer facilities.
- Consider government and agency policies (see Table C1).
- Consult with stakeholders, agencies and the community.
- Locate new zones for sensitive land uses to avoid conflicts with existing waste disposal sites. Consider site-specific buffers around waste disposal sites or, in the absence of detailed information, generic buffers.
- Consider new waste disposal facilities as part of a strategy for waste management for the region. Strategic plans that propose locations for new facilities should be supported by adequate environmental studies or clearly acknowledge that new facilities are dependent on a thorough assessment addressing site characteristics and its suitability, the significance of the surrounding environment, potential environmental impacts including projected emissions and the proposal's ability to meet acceptable environmental criteria.
- Consider accommodating land uses that assist in resource recovery and strategic waste management, for example, resource recovery precincts.
- Consider adding objectives that address waste management and environmental sustainability to strategic plans and planning schemes.
- Determine procedures to apply to other levels of planning, for example, a procedure to ensure that applicants provide information on wastes and waste management measures.

C7.3.2 LOCAL AREA PLANNING

The EPA recommends that the following checklist is applied when new industrial and commercial land uses and developments that raise waste management issues are under consideration.

CHECKLIST FOR INDUSTRIAL AND COMMERCIAL PROJECTS

- ☐ Identify the likely wastes that will be produced and processed and will require disposal at each stage of project implementation, for example, construction, transport, operation, future expansion, decommissioning.
- ☐ Consider environmental principles, guidelines, objectives and criteria for waste management. Table C1 provides a starting point. Apply the hierarchy for waste management and key principles referred to in C7.2.
- ☐ Consider how wastes can be avoided or minimised through the adoption of best practice measures. The EPA's concept of best practice is described in EPA (2003b).
- ☐ Identify the potential environmental impacts. Modelling of impacts may be appropriate to enable informed decision-making. The applicant may need to engage consultants with appropriate expertise to demonstrate whether environmental objectives and criteria can be met. In some instances, independent expert advice will need to be sought to confirm whether studies have been carried out adequately.
- ☐ In the case of a proposed new facility likely to have significant off-site emissions or environmental impacts, applicants are encouraged to address a range of alternative sites and technologies.
- ☐ Consult with stakeholders, agencies and the community. Identify other approval processes that may integrate with planning processes to achieve appropriate environmental outcomes (see Table C1).
- ☐ Check that the site size, layout and design allow for adequate on-site waste management on commencement of operations, and in the future.
- ☐ Ensure that adequate buffers to sensitive land uses are maintained. Advice on buffers is provided in EPA Guidance Statement No. 3 Separation Distances Between Industrial and Sensitive Land Uses (EPA 2005b).
- ☐ Ensure that adequate buffers to natural resources and conservation areas are maintained.
- ☐ Apply planning conditions. These may depend on the extent to which other decision-making processes will address issues. Consider conditions that require:
 - ☐ the preparation and implementation of a Waste Management Plan (see Attachment A1-2 for the main components of an environmental management plan)
 - ☐ criteria to be met (including litter management)
 - ☐ monitoring of environmental impacts, reporting of monitoring results and management actions to be implemented if triggered by specified events or monitoring results.

C7.4 REFERRAL TO THE EPA

Schemes and planning applications will in some instances raise significant waste management issues that require assessment by the EPA. Generic advice on referring schemes and proposals to the EPA is set out in A3.2.1 and A4.2.1. The advice below complements the generic advice.

C7.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

The referral of a proposal to the EPA should be considered if:

- Waste products are likely to significantly impact on areas of high conservation significance, ecosystem health, or human health, welfare and amenity (see Attachment A4-1).
- The agencies with key expertise raise significant environmental concerns, and these concerns are not likely to be addressed through decision-making processes.
- For any other reason, it is likely that waste will have a significant adverse impact on the environment.

Referral is not usually expected when recognised environmental criteria are met, when the EPA's advice in its position statements and guidance statements is followed, and if any significant concerns raised by the government agencies with key environmental expertise will be satisfactorily addressed through decision-making processes.

C7.4.2 INFORMATION TO ACCOMPANY A REFERRAL

When a scheme or proposal is referred to the EPA and environmental impacts from waste have the potential to influence the level of assessment, information that may assist the EPA to set an appropriate level of assessment includes:

- a description of the receiving biophysical environment (supported by aerial and other photographs where practicable), information on the environmental significance of the receiving environment, likely wastes and their characteristics, and the potential environmental impacts of the proposed development on the environment and the community
- the environmental studies carried out or proposed
- the design and management of the intended development indicating how potential impacts on the environment and the community will be avoided or minimised
- a list of all approvals that are required
- information on the extent of consultation carried out with authorities, organisations and the public, and what further consultation is proposed.

The EPA Service Unit will review any information submitted. If it is not sufficient for the EPA to decide the level of assessment of the proposal or whether to assess the scheme, additional information may be requested. Where further information is required and where possible, please provide all relevant data in digital and GIS format.



**Environmental
Protection Authority**

Environmental Guidance for Planning and Development

Part D

Social Surroundings

Part D

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Overview

Social surroundings

The definition of **environment** in the *Environmental Protection Act 1986* (EP Act) includes the **social surroundings** of man. For the purposes of the Act, the social surroundings of man are '... his aesthetic, cultural, economic and social surroundings to the extent that those surroundings directly affect or are affected by his physical or biological surroundings' (s3(2) EP Act).

Therefore, when determining the key **environmental factors** associated with a scheme or a referred proposal, the Environmental Protection Authority (EPA) will have regard for impacts on the community's physical or biological surroundings that have aesthetic, cultural, economic and social implications.

Relevant factors for environmental impact assessment that the EPA has identified in relation to the community's aesthetic, cultural and social surroundings include impacts on the following:

- Aboriginal heritage (see Chapter D1)
- non-indigenous heritage (see Chapter D2)
- visual amenity (see Chapter D3)
- recreation (see Chapter D4).

The EPA calls these social surroundings factors. The EPA from time to time may identify other social surroundings factors when considering schemes and proposals.

The EPA's current position on **risk** is outlined in Chapter D5.

Chapter D1

Indigenous heritage

D1.1 INDIGENOUS HERITAGE AND THE ENVIRONMENTAL PROTECTION ACT

Chapter D1 provides the EPA's advice on the management of the environmental factor 'Indigenous heritage' during land use planning and development processes to promote outcomes consistent with the objectives of the *Environmental Protection Act 1986* (EP Act).

Under the EP Act, the protection of some aspects of Indigenous heritage is potentially a relevant consideration in the environmental impact assessment process. Indigenous heritage can be a relevant consideration when it is linked directly to the physical or biological attributes of the environment, and where the protection and management of those attributes is threatened as a result of development.

In Western Australia, the *Aboriginal Heritage Act 1972* is the primary legislation ensuring the protection of Indigenous heritage. However, the broad scope of the EP Act enables protection of portions of the environment where this is not possible under the *Aboriginal Heritage Act 1972*. As an example, to protect a key fauna species important for cultural reasons, physical protection of a habitat type may be appropriate. Such protection would go beyond what is possible under the *Aboriginal Heritage Act 1972*, but would potentially be within the ambit of the EP Act.

Information on the protection of Indigenous heritage pursuant to the *Aboriginal Heritage Act 1972* is available from the Department of Indigenous Affairs website www.dia.wa.gov.au.

D1.2 EPA'S POSITION ON INDIGENOUS HERITAGE

EPA's objective

To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation (EPA 2004e).

The EPA's position is described in EPA Guidance Statement No. 41 *Assessment of Aboriginal Heritage* (EPA 2004h). The EPA recommends that the advice in Guidance Statement No. 41 is applied when a proposal requires referral to the EPA and when Indigenous heritage is likely to be a key environmental factor. The advice is also applicable to schemes.

Where there is a potential for significant impacts on the biological and physical environment from a proposed development that may adversely affect Indigenous heritage, the EPA recommends the following actions:

- Identify potential impacts on the environment, and provide information to assist in addressing Indigenous heritage. Actions that may be pertinent to this process are:
 - consulting with the staff of the Department of Indigenous Affairs and reviewing any site records (desk-top review) in accordance with the *Aboriginal Heritage Act 1972*
 - an Indigenous heritage survey where an adequate survey has not previously been undertaken, including consultation with Indigenous people which may include an anthropological survey, and, if necessary an archaeological survey
 - informing the relevant Indigenous people about details of the proposed development including potential environmental impacts
 - consulting with the relevant Indigenous people to enable them to make known to the proponent their concerns in regard to environmental impacts as they affect heritage matters.
- Propose management measures.
- Demonstrate that the requirements of the *Aboriginal Heritage Act 1972* will be or have been met, and that any environmental concerns raised by Indigenous people have been adequately considered by the proponent in its management of environmental impacts, and any changes as a result of this process are made known to the relevant Indigenous people.
- Implement approved management measures.

The above actions assist in ensuring that the objectives of the EP Act will be met. Additional actions may need to be carried out to meet the requirements of all relevant legislation and good practice.

Consultation with Indigenous elders and groups should be appropriate to their needs and requirements. To assist consultation, the Western Australian government and the Aboriginal and Torres Strait Islander Commission (ATSIC) have published *Consulting Citizens: Engaging with Aboriginal Western Australians* (ATSIC et al. 2004).

D1.3 CONSIDERING INDIGENOUS HERITAGE DURING PLANNING

With respect to land use planning and development projects, the EPA expects that outcomes that meet the objectives of the EP Act will in most instances be achieved through compliance by developers with the *Aboriginal Heritage Act 1972*, and through due consideration of heritage issues during land use planning decision-making processes.

The EPA recommends that issues relevant to the protection of Indigenous heritage be considered, as appropriate, at an early stage of the planning process, and at each subsequent stage. Consideration of Indigenous Heritage early in the planning process is important to ensure that:

- indigenous heritage sites are properly protected
- disruption of project timelines or budgets does not occur due to a developer's obligation to meet the *Aboriginal Heritage Act 1972* or a complaint from the Indigenous community
- the importance of protecting indigenous heritage is emphasised.

D1.3.1 BROAD SCALE PLANNING

The EPA recognises advantages in considering heritage issues at the strategic and initial planning phases when the principles for identifying open space and development areas are being determined. The EPA recommends that local government and state planning authorities and proponents, in consultation with the relevant communities and agencies, identify issues relevant to Indigenous heritage, related to the physical and biological environment in their areas.

Procedures may then be identified to deal with the issue of adequately protecting areas of significance at the subsequent levels of planning.

D1.3.2 LOCAL AREA PLANNING

The EPA recommends that planning authorities satisfy themselves that the actions outlined in section D1.2 have been, or will be, implemented as appropriate.

An acceptable outcome with respect to a rezoning, subdivision and development may depend on siting and design, and on enforceable scheme conditions or development conditions applicable to the pre-construction, construction, operation and/or decommissioning stages.

Where Indigenous heritage may be an issue, it is recommended that the applicant is required to demonstrate compliance with the *Aboriginal Heritage Act 1972* before approval of a planning application is considered (including conditional approval of a subdivision application). This is because there may be implications for site layout, design and land use.

Planning authorities should be aware that physical protection of some areas may not be possible under the *Aboriginal Heritage Act 1972*, and that in such cases protection through planning requirements or referral under the EP Act may need to be considered.

D1.4 REFERRAL TO THE EPA

General advice on how to refer a scheme to the EPA is in A3.2.1. General advice on how and when to refer a proposal is set out in A4.2.1.

D1.4.1 TRIGGERS FOR REFERRAL OF A PROPOSAL TO THE EPA

Referral to the EPA of a subdivision or development proposal should be considered if implementation of the proposal is likely to cause a significant impact on the physical or biological environment such that:

- indigenous cultural and heritage associations are likely to be adversely affected
- the impacts are such that they cannot be taken into account under the *Aboriginal Heritage Act 1972*.

D1.4.2 INFORMATION TO ACCOMPANY A REFERRAL

To accompany a referral to the EPA of a scheme or proposal where Indigenous heritage may be a relevant environmental factor, information that will assist the EPA to set the level of assessment includes:

- a description of the aspects of the physical and biological environment that may be affected by the scheme or proposal, particularly those that may be important for Indigenous heritage reasons
- details of any relevant surveys that have been carried out, or are proposed
- details of consultation carried out, or proposed, including consultation with the Department of Indigenous Affairs
- the statutory approvals required before use or development may be carried out
- the proposed management of the issue to avoid or minimise environmental impacts that may adversely affect aspects of Indigenous heritage.

The EPA Service Unit will review any information submitted and if not sufficient for the EPA to decide the level of assessment of the proposal or whether to assess the scheme, additional information may be requested.

Chapter D2

Non-indigenous heritage

D2.1 NON-INDIGENOUS HERITAGE AND THE ENVIRONMENTAL PROTECTION ACT

This chapter provides the EPA's advice in relation to non-indigenous heritage and land use planning and development, to promote outcomes that meet the objectives of the *Environmental Protection Act 1986* (EP Act).

Appreciation of natural and built environmental features that form part of the community's heritage is an important cultural characteristic. Heritage places are of many types and may include **geoheritage** sites.

The main lists that include Western Australia heritage sites are:

- The World Heritage List. The Shark Bay World Heritage property and Purnululu National Park are world heritage listings in Western Australia (see www.deh.gov.au/heritage).
- The National Heritage List. This is a new list of natural, indigenous and historic places with outstanding heritage value to the nation (see www.deh.gov.au/heritage).
- The Commonwealth Heritage List. This is a new list of heritage places owned or managed by the Commonwealth (see www.deh.gov.au/heritage).
- The Register of National Estate. This is a nation-wide heritage list for Australia maintained by the Australian Heritage Council that encompasses natural, indigenous and historic places (see www.ahc.gov.au/register).
- Heritage Council of Western Australia lists of registered and non-registered heritage places (see www.heritage.wa.gov.au)
- Local heritage listings. These may include a local municipal inventory prepared under the *Heritage of Western Australia Act 1990*, and a heritage list prepared under the provisions of a local town planning scheme.
- National Trust lists (see www.ntwa.com.au).

The broad scope of the EP Act enables the EPA to consider heritage during environmental impact assessment where a scheme or proposal is likely to lead to changes to the physical or biological environment that adversely affect historical or cultural associations.

However, in most instances the objective of the EP Act is met through the application by decision-making authorities and other agencies of a range of legislation including:

- the *Heritage of Western Australia Act 1990*
- other legislation specific to heritage such as the *Australian Heritage Council Act 2003*, the *Historic Shipwrecks Act 1976* and the *Maritime Archaeology Act 1973*
- the *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* that is relevant to proposed actions on World Heritage property, National Heritage places and Commonwealth Heritage places
- land use planning and development legislation
- the EP Act
- the *Conservation and Land Management Act 1984*.

D2.2 EPA'S POSITION ON NON-INDIGENOUS HERITAGE

EPA's objective

To ensure that changes to the biophysical environment do not adversely affect historical and cultural associations and comply with relevant heritage legislation (EPA 2004e).

The EPA expects that heritage places important to the community will in most instances be protected through heritage protection legislation such as the *Heritage of Western Australia Act 1990* and through decision-making processes including land use planning processes that can protect the natural and cultural heritage assets of the state.

Land managers, for example, the Department of Environment and Conservation, and the community also have an important role in protecting these assets.

However, there may be instances when these processes and responsibilities are not likely or not able to adequately consider and manage significant impacts from new projects on the environment that affect heritage. In these instances the EPA may consider applying the environmental impact assessment process.

When the EPA is considering the social surroundings factor of indigenous heritage during the environmental impact assessment process, the EPA focuses on the protection of natural sites of world, national or state heritage significance. The EPA is unlikely to recommend the approval of schemes and proposals that have significant adverse impacts on these sites. The EPA may also consider other heritage sites during the environmental impact assessment process following the submission of a well-justified case demonstrating that the site is of high significance.

Shark Bay World Heritage property

The Shark Bay World Heritage property is an area of very high environmental value in Western Australia. In view of the activities occurring in and near this area, the EPA has published advice for this area. EPA Guidance Statement No. 49 *Guidance Statement for Assessment of Development Proposals in Shark Bay World Heritage Property* (EPA 2000b) provides information on what the EPA will take into account when considering proposals that are within and adjacent to the Shark Bay World Heritage property.

The EPA has also provided advice in EPA Bulletin 1115 on the incompatibility of petroleum industry activities with the environmental values and cultural uses of the Shark Bay World Heritage Area relevant to marine and terrestrial areas (EPA 2003e).

D2.3 CONSIDERING NON-INDIGENOUS HERITAGE DURING PLANNING

The EPA recommends that the following procedures and actions are considered and applied as appropriate during planning processes to promote outcomes that meet the objective of the EP Act in relation to non-indigenous heritage.

CHECKLIST FOR NEW SCHEMES AND PROPOSALS

- ☐ Identify any likely impacts on the biophysical environment that may raise heritage issues.
- ☐ Research the significance of any heritage sites likely to be impacted. Actions that may assist include the following:
 - ☐ desk-top review of all available heritage lists, including local, regional and national lists (see D2.1)
 - ☐ field surveys, as appropriate
 - ☐ consulting with the public, stakeholders and heritage organisations.
- ☐ Consider to what extent the setting of a site, as well as the site itself, may require protection.
- ☐ Propose management measures, and show how environmental concerns raised by stakeholders have been addressed.
- ☐ Consider the extent to which other approval processes may address the issue, and complementary actions that can assist in achieving the required outcomes.
- ☐ Following decision-making that takes into account the above considerations, implement any approved management measures.

A more comprehensive outline of actions that help ensure environmental issues are adequately considered during planning is provided in A1.4.

Management measures with respect to new land uses or developments may need to address siting and design issues, and development scale and characteristics. It may also be relevant to consider requirements applicable to the construction, operational and/or decommissioning phases. The EPA is aware that planning employs a range of mechanisms to manage heritage issues.

D2.4 REFERRAL TO THE EPA

Apart from a proposal which may impact World Heritage property, the EPA does not normally expect a proposal to be referred where the only potentially key environmental factor is non-indigenous heritage. However, in some cases, referral may be appropriate, especially if the issue is of key significance for Western Australia and the issue is not to be, or cannot be, fully and publicly examined through the planning or other legislative processes.

In the case of a proposal that may impact on the Shark Bay World Heritage property, prior to any referral the EPA expects the procedures described in EPA Guidance Statement No. 49 *Guidance Statement for Assessment of Development Proposals in Shark Bay World Heritage Property* to be followed. The procedures in Guidance Statement No. 49 should also be considered in the case of a scheme that applies to land in or adjoining the Shark Bay World Heritage property.

The reader should refer to A4.2.1 for a discussion on the circumstances when referral of a proposal to the EPA by an applicant or decision-making authority is appropriate. Referral of a scheme to the EPA is addressed in A3.2.1.

If a scheme or proposal is referred to the EPA, and is subject to the environmental impact assessment process (generally because other environmental issues apply), the EPA will decide whether the issue of non-indigenous heritage will be treated as a key environmental factor in the assessment and be subject to environmental recommendations.

D2.4.1 INFORMATION TO ACCOMPANY A REFERRAL

To accompany a referral to the EPA of a scheme or proposal where non-indigenous heritage may be a relevant factor, information that will assist the EPA to set the level of assessment includes:

- identification of any known sites of non-indigenous heritage interest that may be affected by the scheme or proposal; how these may be affected; and the extent of any heritage studies carried out or proposed
- the results of any community and agency consultation carried out, for example, consultation with the Heritage Council of Western Australia
- approvals required before development may proceed
- the proposed management and actions to be implemented to avoid or minimise environmental impacts on non-indigenous heritage sites.

The EPA Service Unit will review any information submitted and if not sufficient for the EPA to decide the level of assessment of the proposal or whether to assess the scheme, additional information may be requested.

Chapter D3

Visual amenity

D3.1 VISUAL AMENITY AND THE ENVIRONMENTAL PROTECTION ACT

This chapter provides the EPA's advice on the protection of visual amenity during land use planning and development processes, to promote outcomes that are consistent with the objectives of the *Environmental Protection Act 1986* (EP Act).

Under the EP Act, the definition of environment includes the community's aesthetic surroundings to the extent that those surroundings are affected by the physical or biological environment. The definition of environmental value includes aesthetic enjoyment of the environment.

Visual amenity, as a key component of aesthetics, is thus a potentially relevant factor in environmental impact assessment as carried out by the EPA in Western Australia.

It is recommended that the advice in Chapter B8 'Landscape and landforms' is considered together with the advice in this chapter, where the protection of the visual amenity of landscapes is a relevant consideration.

Poor air quality can affect visual amenity (for example, haze and dust). For advice on protecting air quality during planning see Chapter C2.

TERMS

Visual amenity is defined as visual landscape character that is valued by the community. Protection of the visual amenity of the surrounding environment is important to the sense of well-being and quality of life of the community.

D3.2 EPA'S POSITION ON VISUAL AMENITY

EPA's objective

To ensure that visual amenity is considered and measures are adopted to reduce adverse visual impacts on the surrounding environment as low as reasonably practicable.

The EPA generally expects that a satisfactory environmental outcome in terms of visual amenity will be achieved through decision-making and management processes that can take visual amenity issues into account. In Western Australia, visual amenity issues are usually addressed through land use planning procedures and by the Department of Environment and Conservation (DEC) and land managers of the public and other estate.

Taking into account the roles and responsibilities of land use planning agencies and DEC, the EPA considers that it does not generally need to focus on visual amenity except in rare instances, for example, when decision-making and management processes cannot or are unlikely to adequately manage significant visual impacts on parts of the environment of high conservation significance or high public interest. In such instances, the EPA may apply environmental impact assessment procedures.

Key principles that the EPA takes into account when visual amenity is examined during the environmental impact assessment process include:

- the retention of natural landscape character in **areas of high conservation significance**
- the visual harmony of new development with the natural surrounds, where the development is in proximity to areas of high conservation significance
- the visual harmony of new development with the surrounds, where the development may be visually dominant.

D3.3 CONSIDERING VISUAL AMENITY DURING PLANNING

To promote outcomes that meet the objectives of the EP Act, the EPA recommends that during strategic planning, planning authorities in consultation with the community and relevant agencies identify the visual amenity issues and valued landscape characteristics and views within their regions, and detail the planning and other procedures that will be utilised to protect visual amenity.

Where there is a potential for a development project or land use to affect valued visual landscape character, the EPA recommends the following procedures.

- Carry out studies to assist the consideration of visual amenity issues, for example, a visual impact assessment based on a recognised methodology (generally, one acceptable to the Department for Planning and Infrastructure or DEC in the case of development and land use that concerns those agencies).
- Consult with the community, stakeholders and relevant agencies.
- Propose management measures and modifications to the original project as appropriate, and demonstrate that any concerns raised by the community and stakeholders have been adequately considered.
- Where approval is granted, incorporate visual management measures as appropriate.
- Implement visual management measures.

A more comprehensive outline of actions and considerations that help ensure that environmental issues are addressed during planning to meet the objective of the EP Act is provided in A1.4.

Visual management measures that help achieve a satisfactory environmental outcome include those in the indicative checklist below. Decision-makers should ensure appropriate siting and design, and consider whether management measures should be applied to the construction phase, the operational phase of development and decommissioning.

INDICATIVE CHECKLIST OF VISUAL MANAGEMENT MEASURES TO PROTECT NATURAL VISUAL CHARACTER

- ☐ Retain natural landforms and bushland vegetation in visually prominent places, as well as in other parts of a site, in order to maintain local landscape character.
- ☐ Avoid locating development where it would be visually obtrusive.
- ☐ Adopt building designs that are of appropriate scale, and utilise architectural styles, construction materials and colours that reflect local character and are harmonious with the surroundings.
- ☐ Rehabilitate disturbed natural areas.
- ☐ Carry out landscaping works, to meet completion criteria.

D3.4 REFERRAL TO THE EPA

General advice on how to refer a scheme to the EPA is in A3.2.1. General advice on how and when to refer a proposal is set out in A4.2.1.

The EPA does not normally expect a proposal to be referred on the basis of visual amenity alone. Occasionally, referral may be appropriate if the issue is of key significance for Western Australia and the issue is not to be, or cannot be, fully and publicly examined through land use planning or other legislative processes.

In relation to visual amenity, schemes and proposals that are of most concern to the EPA are generally those likely to lead to a significant adverse impact on the visual landscape associated with:

- an area of high conservation significance
- an area that is of high heritage, cultural or social significance due to its natural features.

If a scheme or proposal is referred to the EPA, and is subject to the environmental impact assessment process, the EPA will decide whether the issue of visual amenity will be treated as a key environmental factor in the assessment and be subject to environmental recommendations.

D3.4.1 INFORMATION TO ACCOMPANY A REFERRAL

Where a scheme or proposal is likely to impact on an area of high conservation significance or of high heritage, cultural or social significance, and visual amenity is a relevant issue, information that may assist the EPA to set an appropriate level of assessment includes:

- the potential impacts on visual amenity, and the results of any landscape and visual impact studies carried out
- advice on the level of community interest, and the results of any community and agency consultation, including any consultation with DEC where the proposal or scheme is on or near estate administered by DEC
- the design and management of the intended development (including how potential impacts on visual amenity will be avoided or minimised).

The EPA Service Unit will review any information submitted and if not sufficient for the EPA to decide the level of assessment of the proposal or whether to assess the scheme, additional information may be requested. Where further information is required and where possible, please provide all relevant data in digital and GIS format.

Chapter D4

Recreation

D4.1 RECREATION AND THE ENVIRONMENTAL PROTECTION ACT

Significant impacts on the physical or biological environment that affect the community's cultural and social surroundings are a relevant consideration in the EPA's environmental impact assessment process, under the *Environmental Protection Act 1986* (EP Act).

Recreational activity is a notable aspect of the community's cultural and social behaviour that may be affected by a scheme or proposal through changes to the environment. For example, a proposed port may alter a portion of the coast used for swimming, walking, meeting friends, windsurfing and recreational fishing.

Recreational use of the environment may thus be treated as a key environmental factor during the environmental assessment process.

This chapter provides the EPA's advice in relation to the environmental factor 'recreation' and land use planning projects, in order to promote outcomes consistent with the objectives of the EP Act.

D4.2 EPA'S POSITION ON RECREATION

EPA's objective

To ensure that existing and planned recreational uses of the environment are not compromised (EPA 2004e).

The EPA expects that the environmental factor 'recreation' will normally be taken into account and appropriately managed through the efforts of proponents and relevant decision-making authorities during planning and other approval processes. However, there may be instances when these processes are not likely or not able to adequately manage significant impacts on the environment that affect recreational use. If these instances relate to a significant proposal or a scheme, the EPA may apply environmental impact assessment procedures.

When the EPA is considering the environmental factor 'recreation' during the environmental impact assessment process, the focus of the EPA is on the protection of recreational opportunities of high importance to the community that derive from the natural environment (for example, the coast) where these are consistent with maintaining key conservation values.

D4.3 CONSIDERING IMPACTS ON RECREATIONAL SITES DURING PLANNING

To achieve a satisfactory outcome with respect to the EP Act, the EPA recommends:

- At a strategic level of planning, planning authorities in consultation with the community and relevant agencies identify portions of the natural environment of recreational significance in their regions, and any associated issues (for example, proposed port development potentially affecting beach usage).
- Detail the planning and other procedures that can be utilised to address recreational issues and protect portions of the environment important for recreational use.
- Implement the planning procedures as rezonings and subdivision and development applications arise.
- In the case of rezonings and planning applications that have significant implications for recreational usage of the environment but are not supported by a strategic plan, first examine the relevant issues associated with recreation and the environment at an appropriate strategic scale.

In relation to land use planning projects which are likely to have impacts on the environment that adversely affect recreation activities, the EPA recommends the following procedures and actions.

- Identify the potential impacts on recreation and the related elements of the environment, and their significance.
- Consult with the community, stakeholders and relevant agencies as appropriate.

- Propose management measures and modifications to the original proposal as appropriate, and demonstrate that any concerns raised by the community and stakeholders have been adequately considered.
- Where approval is granted, incorporate appropriate management measures.
- Implement management measures.

Management measures may need to address siting, subdivision layout, design of development, and the construction and operation phases of any development. In some instances, the provision of replacement structures and nodes for recreation may need to be considered.

D4.4 REFERRAL TO THE EPA

The EPA does not normally expect a proposal to be referred where the only environmental issue is the potential for impacts on the environment that affect recreation opportunities. However, in some limited cases, referral may be appropriate, especially if the issue is of key significance for Western Australia and the issue is not to be, or cannot be, fully and publicly examined through the planning or other legislative processes.

If a scheme or proposal is referred and is subject to the formal environmental impact assessment process (generally because other environmental issues also apply), the EPA will decide whether the issue of recreation will be treated as a key environmental factor in the assessment and be subject to environmental recommendations.

D4.4.1 INFORMATION TO ACCOMPANY A REFERRAL

Where potential impacts on the environment that affect recreation may influence the level of assessment set by the EPA on a referral, information that may assist the EPA to set an appropriate level of assessment includes:

- identifying the portion of the environment significant for recreation
- information on the recreational usage of the site or locality, the potential impacts of development on the environment that may affect recreation, and any relevant studies that have been carried out or are proposed
- advice on any consultation carried out with stakeholders
- the statutory approvals required before the referral may be implemented
- the proposed management and actions to avoid or minimise adverse impacts on recreation.

The EPA Service Unit will review any information submitted and if not sufficient for the EPA to decide the level of assessment of the proposal or whether to assess the scheme, additional information may be requested.

Chapter D5

Risk

D5.1 EPA'S POSITION ON RISK

Before 2003, the EPA considered the issue of off-site individual risk of fatality associated with hazardous industrial plant (including pipeline corridors) during the environmental impact assessment process and when providing advice pursuant to section 16 *Environmental Protection Act 1986* (EP Act).

Two EPA guidance statements on aspects of risk assessment and management were published (EPA 2000g, EPA 2000h). During this time the EPA was perceived as being a primary regulator in Western Australia of off-site individual risk of fatality associated with hazardous industrial plant.

This situation has now changed. Recent interpretation of the EP Act is that the environmental impact assessment process is not an appropriate process for the consideration of public safety.

The only aspect of risk that the EPA is likely to continue to assess during environmental impact assessment is significant risk to the physical or biological environment. This is known as environmental risk and relates to the likelihood of damage to the physical or biological environment arising from a hazardous event associated with hazardous industrial plant.

The main purposes of this chapter are to clarify the status of the EPA risk criteria in the above-mentioned EPA guidance statements, and to indicate the main agencies that now have a role in managing activities that have public safety implications, to assist people involved in land use planning processes.

D5.2 STATUS OF THE EPA'S RISK CRITERIA

In July 2000, the EPA published Guidance Statement No. 2: *Guidance for Risk Assessment and Management: Off-site Individual Risk from Hazardous Industrial Plant* (EPA 2000g). This publication involved extensive consultation and the guidance statement has found wide acceptance. The EPA recommends that agencies continue to use the individual fatality risk criteria as non-statutory guidelines until alternative criteria are developed.

The EPA Draft Guidance Statement No. 50 *Achieving EPA Risk Criteria for Development in Proximity to High Pressure Gas Transmission Pipelines* (EPA 2000h) has been rescinded. At the time of publication of this guidance statement, a government working group is developing a planning process for new developments in proximity to high pressure gas pipelines in the metropolitan area.

D5.3 GOVERNMENT AGENCY ROLES AND RESPONSIBILITIES

A number of government agencies currently consider public risk issues in the context of their particular regulatory role and processes. Indicative information is provided below on these agencies, to assist those involved in planning processes to identify potentially relevant processes and sources of advice.

Land use planning agencies

The Western Australian Planning Commission (WAPC) has developed overarching principles for land use planning that include the consideration of risk, hazard and public safety issues; compatibility between land uses; the protection of residential areas; and the protection of strategic industry and infrastructure. Risk issues can be relevant considerations during strategic planning, the formulation of planning schemes, and decision-making on subdivisions, developments and planning scheme amendments. Risk from unexploded ordnance is typically taken into account during the land use planning process.

TERMS

Risk is 'the likelihood that specific effects harmful to man and the environment will occur within a specified period or in specified circumstances'.

Individual risk of fatality is 'the chance (likelihood or probability) per year that any one member of the general public will be killed as a result of the exposure to an activity'.

Hazardous industrial plant is 'plant used for the storage, transportation (including pipelines, road or rail) or processing of hazardous substances which may pose a significant risk to the employees, the surrounding community and the environment'.

A **hazardous event** is 'an event which can cause harm (to employees, the public or the environment)'.

Department for Planning and Infrastructure (DPI) (management of pipeline corridors)

DPI functions include administering the Dampier to Bunbury gas pipeline corridor.

Department of Industry and Resources (DoIR)

The roles of DoIR relevant to public risk include:

- petroleum pipeline regulation under the *Petroleum Pipelines Act 1969* and Acts relating to offshore pipelines
- regulation of dangerous goods, including explosives, under the *Dangerous Goods Safety Act 2004*
- strategic planning for some major industrial estates including risk modelling for the Kwinana Industrial Estate.

Department of Environment and Conservation (DEC)

DEC roles include:

- the regulation of emissions from prescribed premises through works approvals and licenses under Part V EP Act (some prescribed premises store or produce substances that may present a risk to people)
- regulation of the transport of controlled wastes (including some hazardous waste) where these are not covered by the *Dangerous Goods (Transport) Act 1998*.

Department of Consumer and Employment Protection

The Department's responsibilities include:

- the safety of workers and others, pursuant to the *Occupational Safety and Health Act 1984*
- safety regulation of electricity and gas infrastructure, pursuant to the *Electricity (Supply Standards and System Safety) Regulations 2001* and the *Gas Standards (Gas Supply and System Safety) Regulations 2000*.

Department of Health

The Department of Health is involved in some risk issues through its responsibility to protect public health and safety under the Health Act 1911. The roles of the Department of Health include:

- regulation of nuisances and offensive trades
- health risk assessment
- setting standards for mass gatherings.

Fire and Emergency Services Authority (FESA)

FESA roles include:

- facilitating the development and maintenance of emergency management arrangements for the state
- responding to incidents involving hazardous materials.

Environmental Protection Authority (EPA)

The EPA considers the risk of damage to the environment from hazardous activities during the environmental impact assessment process. The EPA has had an historical role in assessing individual fatality risk from major hazardous industrial plant and infrastructure, and in providing guidance on risk criteria for Western Australia. However, these latter roles have ceased.



**Environmental
Protection Authority**

Environmental Guidance for Planning and Development

Part E

Sources of Information

Part E

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- Western Australian Planning Commission 2000b *Introducing Liveable Neighbourhoods: A Western Australian Government Sustainable Cities Initiative* Edition 2 Western Australian Planning Commission, Perth (check www.wapc.gov.au for latest update).
- Western Australian Planning Commission 2001 *Gnangara Land Use and Water Management Strategy* Western Australian Planning Commission, Perth.
- Western Australian Planning Commission, Department of Environmental Protection, Water and Rivers Commission & Department of Minerals and Petroleum Resources 2002 *Review of Kwinana Air-Quality Buffer: For Public Comment* Western Australian Planning Commission, Department of Environmental Protection, Water and Rivers Commission & Department of Minerals and Petroleum Resources, Perth.
- Western Australian Planning Commission 2003a *Acid Sulfate Soils* Planning Bulletin No. 64, Western Australian Planning Commission, Perth.
- Western Australian Planning Commission 2003b *Policy for Dealing with Conflicts Between Residential Subdivision and Market Gardens in East Wanneroo* Planning Bulletin No. 63 Western Australian Planning Commission, Perth.
- Western Australian Planning Commission 2003c *Middle Helena Catchment Area Land Use and Water Management Strategy: For Public Comment* Western Australian Planning Commission, Perth.

- Western Australian Planning Commission 2004a
Bushland Policy for the Perth Metropolitan Region: Statement of Planning Policy 2.8: Draft for public comment, Western Australian Planning Commission, Perth (now State Planning Policy No.2.8).
- Western Australian Planning Commission 2004b
State Industrial Buffer Statement of Planning Policy 4.1: Western Australian Planning Commission, Perth (now State Planning Policy No. 4.1).
- Western Australian Planning Commission 2004c
Guidelines for Wind Farm Development Planning Bulletin No. 67, Western Australian Planning Commission, Perth.
- Western Australian Planning Commission 2005a
State Planning Policy No. 2.2: Gnangara Groundwater Protection Policy Western Australia Government Gazette No. 150, 5 August 2005, State Law Publisher, Perth.
- Western Australian Planning Commission 2005b
State Planning Policy Road and Rail Transport Noise: Draft Western Australian Planning Commission, Perth.
- Western Australian Planning Commission 2006
State Planning Policy No. 1 State Planning Framework (Variation 2) (Draft) Western Australian Planning Commission, Perth.
- Western Australian Planning Commission 2006
Water Resources Statement of Planning Policy 2.9: Western Australian Planning Commission, Perth.
- Western Australian Planning Commission 2006
Statement of Planning Policy 2.10: Swan–Canning River System Western Australian Planning Commission, Perth.
- Western Australian Planning Commission 2006
Statement of Planning Policy 5.3: Jandakot Airport Vicinity Western Australian Planning Commission, Perth.

Chapter E2

EPA's publications

Unless otherwise noted, the documents in E2 are published by the EPA, Perth.

Most current EPA publications are available on www.epa.wa.gov.au.

E2.1 State Environmental Policy (SEP) and Environmental Protection Policies (EPPs)

SEP

Government of Western Australia 2005 *State Environmental (Cockburn Sound) Policy 2005* Government of Western Australia, Perth.

Gazetted EPPs

Note: Regulations accompany some environmental protection policies.

Environmental Protection (Swan Coastal Plain Lakes) Policy 1992 in Western Australian Government Gazette No. 179, 18 December 1992, State Law Publisher, Perth.

Environmental Protection (Gnangara Mound Crown Land) Policy 1992 in Western Australian Government Gazette, 24 December 1992, State Law Publisher, Perth.

Environmental Protection (Peel Inlet–Harvey Estuary) Policy 1992 in Western Australian Government Gazette No. 234, 30 December 1997, State Law Publisher, Perth.

Environmental Protection (South West Agricultural Zone Wetlands) Policy 1997 in Western Australian Government Gazette No. 234, 30 December 1997, State Law Publisher, Perth.

Environmental Protection (Swan and Canning Rivers) Policy 1997 in Western Australian Government Gazette No. 140, 10 July 1998, State Law Publisher, Perth.

Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999 in Western Australian Government Gazette, 21 December 1999, State Law Publisher, Perth.

Environmental Protection (Ozone Protection) Policy 2000 in Western Australian Government Gazette No. 216, 17 October 2000, State Law Publisher, Perth.

Environmental Protection (Western Swamp Tortoise Habitat) Policy 2002 in Western Australian Government Gazette No. 24, 18 February 2003, State Law Publisher, Perth.

Environmental Protection (Goldfields Residential Areas) (Sulfur Dioxide) Policy 2003 in Western Australian Government Gazette, 18 March 2003, State Law Publisher, Perth.

E2.2 EPA position statements

Environmental Protection of Cape Range Position Statement No. 1 (1999)

Environmental Protection of Native Vegetation in Western Australia: Clearing of Native Vegetation, with Particular Reference to the Agricultural Area Position Statement No. 2 (2000).

Terrestrial Biological Surveys as an Element of Biodiversity Protection Position Statement No. 3 (2002)

Environmental Protection of Wetlands Position Statement No. 4 (2004)

Environmental Protection and Sustainability of the Rangelands in Western Australia Position Statement No. 5 (2004)

Towards Sustainability Position Statement No. 6 (2004)

Principles of Environmental Protection Position Statement No. 7 (2004)

Environmental Protection in Natural Resource Management Position Statement No. 8 (2005)

Environmental Offsets Position Statement No. 9 (2006)

E2.3 EPA guidance statements

Guidance for the protection of tropical arid zone mangroves along the Pilbara coastline Final Guidance Statement No. 1 (2001)

Guidance for Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant Final Guidance Statement No. 2 (2000)

- Separation Distances between Industrial and Sensitive Land Uses* Draft Guidance Statement No. 3 (2005)
- Deep and Shallow Well Injection of Liquid Industrial Waste* Final Guidance Statement No. 4 (2003)
- Environmental Noise* Draft Guidance Statement No.8 (2007)
- Level of Assessment for Proposals Affecting Natural Areas within the System 6 Region and Swan Coastal Plain Portion of the System 1 Region* Final Guidance Statement No. 10 (2006)
- Guidance Statement for Minimising Greenhouse Gas Emissions* Final Guidance Statement No. 12 (2002)
- Management of Air Emissions from Biomedical Waste Incinerators* Final Guidance Statement No. 13 (2000)
- Guidance Statement for Emissions of Oxides of Nitrogen from Gas Turbines* Final Guidance Statement No. 15 (2000)
- Guidance Statement for Remediation Hierarchy for Contaminated Land* Final Guidance Statement No. 17 (2000)
- Prevention of Air Quality Impacts from Land Development Sites* Final Guidance Statement No. 18 (2000)
- Environmental Offsets* Draft Guidance Statement No.19 (2007)
- Protection of Lake Clifton Catchment* Final Guidance Statement No. 28 (1998)
- Benthic Primary Producer Habitat Protection for Western Australia's Marine Environment* Final Guidance Statement No. 29 (2004)
- Environmental Guidance for Planning and Development* Draft Guidance Statement No. 33 (2005)
- Linkage between EPA Assessment and Management Strategies, Policies, Scientific Criteria, Guidelines, Standards and Measures Adopted by National Councils* Final Guidance Statement No. 34 (1998)
- Guidance Statement for Management of Mosquitoes by Land Developers* Final Guidance Statement No. 40 (2000)
- Assessment of Aboriginal Heritage* Final Guidance Statement No. 41 (2004)
- Assessment of Odour Impacts from New Proposals* Final Guidance Statement No. 47 (2002)
- Groundwater Environmental Management Areas* Draft Guidance Statement No. 48 (1998)
- Guidance Statement for Assessment of Development Proposals in Shark Bay World Heritage Property* Final Guidance Statement No. 49 (2000)
- Terrestrial Flora and Vegetation Surveys for Environmental Impact Assessment in Western Australia* Final Guidance Statement No. 51 (2004)
- Consideration of Subterranean Fauna in Groundwater and Caves during Environmental Impact Assessment in Western Australia* Final Guidance Statement No. 54 (2003)
- Implementing Best Practice in Proposals Submitted to the Environmental Impact Assessment Process* Final Guidance Statement No. 55 (2003)
- Terrestrial Fauna Surveys for Environmental Impact Assessment in Western Australia* Final Guidance Statement No. 56 (2004)

E2.4 EPA referral and EIA guides

- DMA Referral Guide—General Guide for State Government Departments and Local Authorities (as Decision-Making Authorities)* Draft (2005)
- General Guide for Referral of Proposals to the EPA* (2002)
- Referral of a Subdivision or Development Proposal to the EPA by a Decision-Making Authority* (2005)
- EPA Referral Form (DMA) – Referral by the Decision-Making Authority* (2005)
- EPA Referral Form (Proponent) – Referral by the Proponent* (2006)
- EIA Scoping Document – Guide to Preparing an Environmental Scoping Document* (2004)
- EIA Principles, Factors and Objectives – Guide to EIA Principles, Factors and Objectives* (2004)
- PER/ERMP Guidelines – Guidelines for Preparing a Public Environmental Review/ Environmental Review and Management Programme* (2004)

Referral of a Scheme to the EPA (2005)

Government of Western Australia 2002a
*Environmental Protection Act 1986
Environmental Impact Assessment (Part IV
Division 1) Administrative Procedures 2002*
Western Australian Government Gazette
No. 26, 8 February 2002, State Law Publisher,
Perth.

E2.5 Key EPA reports relevant to land use planning and development

Department of Conservation and Environment
1976–1983, *Conservation Reserves For
Western Australia as Recommended by
the Environmental Protection Authority*
Department of Conservation and
Environment Western Australia, Perth.

A number of publications cover Systems 1 to 12
and are known as the 'Red Books' (Note: some
recommendations have been superseded
by later conservation recommendations
endorsed by government).

Environmental Protection Authority 1993a
*Red Book Status Report (1993) on the
Implementation of Conservation Reserves
for Western Australia* Report No. 15,
Environmental Protection Authority, Perth.

Environmental Protection Authority 1993
*Strategy for the Protection of Lakes and
Wetlands of the Swan Coastal Plain* Bulletin
685, Environmental Protection Authority,
Perth.

Environmental Protection Authority 1993 *A
Guide to Wetland Management in the
Perth and Near Perth Swan Coastal Plain
Area* Bulletin 686, Environmental Protection
Authority, Perth.

Environmental Protection Authority 2001
*Advice on Aspects of Bush Forever: Advice to
the Minister for the Environment from the
Environmental Protection Authority under
Section 16(e) of the Environmental Protection
Act 1986* Bulletin 1007, Environmental
Protection Authority, Perth.

Environmental Protection Authority 2001 *A
Policy Framework for the Establishment of
Wetland Banking Instruments in Western
Australia: Draft for Public Comment*
Environmental Protection Authority, Perth.

Environmental Protection Authority 2003
*Greater Bunbury Region Scheme: Western
Australian Planning Commission: Report and
Recommendations of the EPA* Bulletin 1108,
Environmental Protection Authority, Perth.

Chapter E3

Department of Environment and Conservation - published series

The following series have been published by the Department of Environment and Conservation or its predecessors. Information on the availability and currency of titles in the series and new titles is on the Department of Environment and Conservation website at www.dec.wa.gov.au or the Department of Environment and Conservation Information Centre on 6364 6500.

- Information on clearing permits (E3.1)
- Wetlands of the Swan Coastal Plain series (E3.2)
- Contaminated sites management series (E3.3)
- Acid sulfate soil guidelines series (E3.4)
- Codes of practice and guidelines for selected industries (E3.5)
- River restoration series – collectively form the *River Restoration Manual* (titles not listed in this Guidance Statement – see DEC website)
- River recovery plan series (titles not listed in this Guidance Statement – see DEC website)
- River science (titles not listed in this Guidance Statement – see DEC website).

Selected inter-organisation publications for primary industry practice are in E5.

E3.1 Information on clearing permits

Protecting Native Vegetation–New Laws for Western Australia (2004)

Applying for Clearing Permits (2004)

Clearing Exemptions–How They Work (2004)

Form C1–Application for a Clearing Permit (Area Permit) (2006)

Form C2–Application for a Clearing Permit (Purpose Permit) (2006)

Application for Licence–Country Areas Water Supply (Clearing Licence) Regulations 1981 (2004)

Clearing in Country Area Water Supply Catchments (2004)

E3.2 Wetlands of the Swan Coastal Plain series

This 7-volume series was published by the Water Authority of Western Australia, Water and Rivers Commission and the Department of Environmental Protection. It covers many aspects of wetlands of the Swan Coastal Plain: their nature and management, techniques in mapping, evaluation and classification, actual mapping, results of research on wetlands in relationship to aquifers, wetland vegetation, invertebrates and waterbirds.

The best known volume is Hill et al. (1996b) that contains a wetland atlas (now superseded by the latest mapping on DoE's *Geomorphic Wetlands Swan Coastal Plain* dataset). The Wetlands of the Swan Coastal Plain Series is now available at wetlands.environment.wa.gov.au. Publications Wetlands of the Swan Coastal Plain.

The volumes in the Wetlands of the Swan Coastal Plain series are as follows:

Balla, S.A 1994 *Wetlands of the Swan Coastal Plain Volume 1: Their Nature and Management* Water Authority of Western Australia and Department of Environmental Protection, Perth.

Hill, A. L., Semeniuk, C. A., Semeniuk, V. & Del Marco, A. 1996a *Wetlands of the Swan Coastal Plain Volume 2a: Wetland Mapping, Classification and Evaluation, Main Report* Water and Rivers Commission and Department of Environmental Protection, Perth.

Hill, A. L., Semeniuk, C. A., Semeniuk, V. & Del Marco, A. 1996b *Wetlands of the Swan Coastal Plain Volume 2b: Wetland Mapping, Classification and Evaluation, Wetland Atlas* Water and Rivers Commission and Department of Environmental Protection, Perth.

Townley, L., Turner, J., Barr, A., Trefry, M., Wright, K., Gailitis, V., Harris, C. & Johnston, C. 1993 *Wetlands of the Swan Coastal Plain Volume 3: Interaction between Lakes, Wetlands and Unconfined Aquifers* Water Authority of Western Australia & Environmental Protection Authority, Perth.

Froend, R.H., Farrell, R.C.C., Wilkins, C.F., Wilson, C.C. & McComb, A.J. 1993 *Wetlands of the Swan Coastal Plain Volume 4: The Effects of Altered Water Levels on Wetland Plants* Water Authority of Western Australia, Perth.

Balla, S.A. & Davis, J.A. 1993 *Wetlands of the Swan Coastal Plain Volume 5: Managing Perth's Wetlands to Conserve the Aquatic Fauna* Water Authority of Western Australia & Department of Environmental Protection, Perth.

Davis, J.A., Rosich, R.S., Bradley, J.S., Growns, J.E., Schmidt, L.G. & Cheal, F. 1993 *Wetlands of the Swan Coastal Plain Volume 6: Wetland Classification on the Basis of Water Quality and Invertebrate Community Data* Water Authority of Western Australia & the Environmental Protection Authority, Perth.

Storey, A.W., Vervest, R.M., Pearson, G.B. & Halse, S.A. 1993 *Wetlands of the Swan Coastal Plain Volume 7: Waterbird Usage of Wetlands on the Swan Coastal Plain* Water Authority of Western Australia, Perth.

E3.3 Contaminated sites management series

Certificate of contamination audit scheme: Draft for comment (2000)

Disclosure statements (2006)

Guidelines for the proposed contaminated sites auditor accreditation scheme (2006)

Reporting of known or suspected contaminated sites (2006)

Site classification scheme (2006)

Development of sampling and analysis programs (2001)

Reporting of site assessments (2001)

Community consultation (2006)

Assessment levels for soil, sediment and water: Draft for comment (2003)

Bioremediation of hydrocarbon contaminated soils in Western Australia (2004)

Potentially contaminating activities, industries, and landuses (2004)

Use of monitored natural attenuation for groundwater remediation (2004)

Site summary form (2007)

The use of risk assessment in contaminated site assessment (2006)

Contaminated sites and the landuse planning process (2006)

E3.4 Acid sulfate soils guidelines series

Draft identification and investigation of acid sulfate soils (2006)

Preparation of an acid sulfate soil management plan (2003)

Treatment and management of disturbed acid sulfate soils (2004)

General guidance on managing acid sulfate soils (2003)

Guidance for groundwater management in urban areas on acid sulfate soils (2003)

Is my house built on acid sulfate soils? Draft (2004)

Proposed framework for managing acid sulfate soils (2004)

E3.5 Codes of practice and guidelines for selected industries

Titles include: abattoirs, abrasive blasting, asphalt plants, automobile wrecking yards, automotive repair, automotive spray painting, cement product manufacturing, concrete batching plants, fibreglass, foundries, fuel storage, industrial spray painting, powder coating, rendering plants, scrap metal recycling works, woodworking premises (some titles are out of print).

Inter-organisation publications for agricultural activities are in E5.

Department of Water – published series

The following series have been published by the Department of Water or its predecessors. Information on the availability and currency of titles in the series and new titles is on the Department of Water website at www.dec.gov.au or by phoning the Department of Water on 6364 7600.

E 4.1 Water quality protection notes

Aquaculture projects (July 2006)
Biosolids: application to land (1999)
Buffers to sensitive water resources (2004)
Chemical Blending (2006)
Dewatering of soil at construction sites (2006)
Extractive industries within Public Drinking Water Source Areas (2005)
Floriculture activities in sensitive environments (2006)
Irrigation with nutrient rich wastewater (2006)
Land use compatibility in Public Drinking Water Source Areas (2004)
Mechanical equipment wash-down (2006)
Mechanical servicing and workshops (2006)
Nurseries and garden centres (2006)
Nutrient and irrigation management plans (2006)
Ponds for stabilising organic waste (2006)
Private drinking water supplies (2006)
Protecting Public Drinking Water Source Areas (2006)
Stormwater management at industrial sites (2006)
Subdivision and rezoning in Public Drinking Water Source Areas (2006)
Sub-soil monitor drains and recovery sumps (2006)
Swimming pools (2006)
Tanks for temporary elevated fuel and chemical storage (2006)
Temporary skid mounted fuel transfer and storage in Public Drinking Water Source Areas (2005)

Toxic and hazardous substance—storage and use (2006)

Water supplies rural lots (non potable use) (2006)

Wineries and distilleries (2006)

E 4.2. Statewide policies (selected titles)

Statewide Policy No. 1 Policy and guidelines for construction and silica sand mining in Public Drinking Water Source Areas (1999)

Statewide Policy No. 2 Policy for pesticide use in Public Drinking Water Source Areas (2000)

Statewide Policy No. 3 Policy statement on water sharing (2000)

Draft Statewide Policy No. 4 Waterways WA: a policy for statewide management of waterways in Western Australia (2000)

Supporting information to Draft Statewide Policy No. 4: Waterways WA (2000)

Statewide Policy No. 5 Environmental water provisions policy for Western Australia (2000)

Statewide Policy No. 14 Draft garden household and stock bore management (2003)

E 4.3 Water quality protection guidelines

No. 1 Guidelines for mining and mineral processing: Mine Dewatering (2000)

No. 2 Guidelines for mining and mineral processing: Tailings facilities (2000)

No. 3 Guidelines for mining and mineral processing: Liners for waste containment (2000)

No. 4 Guidelines for mining and mineral processing: Installation of minesite groundwater monitoring bores (2000)

No. 5 Guidelines for mining and mineral processing: Minesite water quality monitoring (2000)

No. 6 Guidelines for mining and mineral processing: Minesite stormwater (2000)

No. 9 Guidelines for mining and mineral processing: Acid mine drainage (2000)

- No. 10 Guidelines for mining and mineral processing: Above-ground fuel and chemical storage (2000)
- No. 12 Environmental management guidelines for vineyards (2000)
- No. 13 Guidelines for horse facilities and activities (2000)
- No. 25 Waste management of kennel operations within the Jandakot UWPCA (1998)

E4.4 Water notes (selected titles)

- WN 1 Wetlands and weeds (2000)
- WN 2 Wetlands and fire (2000)
- WN 3 Wetland vegetation (2000)
- WN 4 Wetland buffers (information partly now superseded) (2000)
- WN 5 Wetlands as waterbird habitat (2000)
- WN 6 Livestock management: construction of livestock crossings (2000)
- WN 7 Livestock management: watering points and pumps (2000)
- WN 8 Habitat of rivers and creeks (2000)
- WN 11 Identifying the riparian zone (2000)
- WN 12 The values of the riparian zone (2000)
- WN 16 River and estuary landscape appreciation and protection (2000)
- WN 17 Sediment in streams (2000)
- WN 18 Livestock management: fence location and grazing control (2000)
- WN 20 Rushes and sedges (2000)
- WN 22 Herbicide use in wetlands (2001)
- WN 23 Determining foreshore reserves (2001)
- WN 27 Demonstration sites of waterways restoration in Western Australia (2002)
- WN 28 Monitoring and evaluating river restoration works (2001)
- WN 29 Long term management of riparian vegetation (2001)
- WN 30 Safeguarding Aboriginal heritage (2002)

E4.5 Water facts (selected titles)

- WF 2 Macroinvertebrates and water quality (2001)
- WF 4 Living streams (1998)
- WF 6 Algal blooms (1998)
- WF 7 The water cycle (1998)
- WF 8 What is groundwater? (1998)
- WF 9 Western Australia's groundwater resources (1998)
- WF 10 Groundwater pollution (1998)
- WF 11 Managing groundwater use (2000)
- WF 13 Flooding in Western Australia (2000)
- WF 14 Floodplain management (2000)
- WF 15 Salinity (2000)
- WF 16 Living wetlands: an introduction to wetlands (2001)

E4.6 Water resource technical reports (selected titles)

- WRT 1 Report on the statewide foreshore policy workshops technical paper in support of the statewide foreshore policy for creeks, streams, rivers and estuaries (1999)
- WRT 2 Historical association of wetlands and rivers in the Perth–Bunbury region (1996)
- WRT 3 Historical association of wetlands and rivers in the Perth–Bunbury Region (1996)
- WRT 12 Mapping and classification of wetlands from Augusta to Walpole in the South West of Western Australia (1997)
- WRT 22 Evaluation of constructed wetlands in Perth (1999)

Chapter E5

Other useful publications on environmental factors

E5.1 Biodiversity, native terrestrial vegetation and fauna

- Berwick, M. 1998 *National Local Government Biodiversity Strategy* Australian Local Government Association in conjunction with Biological Diversity Advisory Council.
- Calver, M.C. & Dell, J. 1998 'Conservation Status of Mammals and Birds in South-Western Australian Forests. Part 1: Is There Evidence of Direct Links Between Forestry Practices and Species Decline and Extinction?' *Pacific Conservation Biology* 4: 296–314.
- Calver, M.C. & Dell, J. 1998 'Conservation Status of Mammals and Birds in South-Western Australian Forests. Part 2: Are There Unstudied, Indirect or Long-Term Links Between Forestry Practices and Species Decline and Extinction?' *Pacific Conservation Biology* 4: 315–25.
- Connell, S. 1995 *Perth Environment Project: Remnant Vegetation Inventory and Assessment* unpublished report to the Australian Heritage Commission (National Estate Grants Programme) and the Ministry for Planning, Perth.
- Conservation Commission of Western Australia 2003 *Forest Management Plan 2004–2013* Conservation Commission of Western Australia, Perth.
- Cresswell, I.D. & Thomas, G.M. 1997 *Terrestrial and Marine Protected Areas in Australia* Environment Australia Biodiversity Group, Canberra, February 1997, Background Report Part H – National Estate Report, Joint Tasmanian Commonwealth Steering Committee, C/o Public Land Use Commission, Hobart.
- Dell J. & How, R. 1995 'Faunal Responses to Fire in Urban Bushland' *Proceedings of a Conference about Fire and Urban Bushland*, Urban Bushland Council, Western Australia, pp 35–41.
- Dell, J., How, R.A. & Burbidge, A.H. 2001 'Vertebrate Fauna of Tuart Woodlands' in Department of Conservation and Land Management & Wildflower Society of Western Australia *Proceedings of a Workshop on Tuart Woodlands* (in press).
- Department of Agriculture, Department of Conservation and Land Management, Department of Environment & Department of Fisheries 2003 *Preliminary Agency Statement of Natural Resource Management Priorities in Western Australia* Department of Agriculture, Department of Conservation and Land Management, Department of Environment & Department of Fisheries, Perth.
- Department of Natural Resources and Environment 2002 *Biodiversity Action Planning: Action Planning for Native Biodiversity at Multiple Scales–Catchment, Bioregional, Landscape, Local* Department of Natural Resources and Environment, Melbourne.
- English, V. & Blyth, J. 1997 *Identifying and Conserving Threatened Ecological Communities (TECs) in the South West Botanical Province* ANCA National Reserves System Cooperative Program: Project Number N702, Final Report: May 1997, Department of Conservation and Land Management, Perth.
- Ford, H.A., Barrett, G.W., Saunders, D.A. & Recher, H.F. 2001 'Why have Birds in the Woodlands of Southern Australia Declined?' *Biological Conservation* 97: 71–88.
- Harvey, M.S., Dell, J. How, R.A. & Waldock, J.M. 1997 *Ground Fauna of Bushland Remnants on the Ridge Hill Shelf and Pinjarra Plain Landforms*, Perth Report to the Australian Heritage Commission, NEP Grant N95/49.
- Harvey, M.S., Waldock, J.M., How, R.A., Dell, J. & Kostas, A. 1997 'Biodiversity and Biogeographic Relationships of Selected Invertebrates from Urban Bushland Remnants, Perth, Western Australia' *Proceedings of Invertebrate Biodiversity and Conservation Symposium Memoirs of Museum of Victoria* 56: 275–280.
- Havel, J.J. & Mattiske Consulting Pty Ltd 2002 *Review of Management Options for Poorly Represented Vegetation Complexes* Conservation Commission, Perth.
- Heddl, E.M., Loneragan, O.W. & Havel, J.J. 1980 'Vegetation of the Darling System' in Department of Conservation and Environment *Atlas of Natural Resources, Darling System, Western Australia* Department of Conservation and Environment, Perth.

- Hopper, S.D., Harvey, M.S., Chappill, J.A., Main, A.R. & Main, B.Y. 1996 'The Western Australia Biota as Gondwanan Heritage' chapter 1, pp 1–46, in Hopper, S.D., Chappill, J.A., Harvey, M.S., & George, A.S. (eds) *Gondwanan Heritage: Past, Present and Future of the Western Australian Biota* Surrey Beatty & Sons in association with Australian Systematic Botany Society & Kings Park and Botanic Garden, Western Australia.
- How, R.A. & Dell, J. 1993 'Vertebrate Fauna of the Perth Metropolitan Region: Consequences of a Modified Environment' in Hipkins, M. (ed.) *Urban Bush Management* Australian Institute of Urban Studies, Western Australia, pp 28–47.
- How, R.A. & Dell, J. 1994 'The Zoographic Significance of Urban Bushland Remnants to Reptiles in the Peth Region, Western Australia' *Pacific Conservation Biology* 1: 132–140.
- How, R.A. & Dell, J. 2000 'Ground Vertebrate Fauna of Perth's Vegetation Remnants: Impact of 170 Years of Urbanisation' *Pacific Conservation Biology* 6: 198–217.
- How, R.A., Harvey, M.S., Dell, J. & Waldock, J.M. 1996 *Ground Fauna of Urban Bushland Remnants in Perth* Report to the Australian Heritage Commission, NEP Grant N93/04.
- Hussey, P. & Mawson, P. 2004 *Requirements for Native Mammals* Wildlife Notes No. 11, Department of Conservation and Land Management, Perth.
- Government of Western Australia 1995 *Urban Bushland Strategy* Government of Western Australia, Perth.
- Government of Western Australia 2002 *Status Report: Tuart Conservation and Protection* prepared by the Tuart Response Group, Perth.
- Government of Western Australia 2003 *An Atlas of Tuart Woodlands on the Swan Coastal Plain in Western Australia* prepared by Ecoscape (Australia) Pty Ltd for the Tuart Response Group, Perth.
- JANIS Forests Criteria 1997 *Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia* a report by the Joint ANZECC/MCFFA National Forest Policy Statement Implementation Sub-committee, Regional Forests Agreement process, Commonwealth of Australia, Canberra.
- Johnstone, R.E. 2001 'Checklist of the Birds of Western Australia' *Records of the Western Australian Museum* Supplement No. 63: 75–90.
- Keighery, B.J. 1994 *Bushland Plant Survey: A Guide to Plant Community Survey* for the Community Wildflower Society of Western Australia (inc.), Nedlands, Western Australia.
- Kitchener, D.J. 1982 'Predictors of Vertebrates Species Richness in Nature Reserves in the Western Australian Wheatbelt' *Australian Wildlife Research* 9: 1–7.
- Kitchener, D.J., Chapman, A., Dell, J., Muir, B.G. & Palmer, M. 1980 'Lizard Assemblages and Reserve Size and Structure in the Western Australian Wheatbelt: Some Implications for Conservation' *Biological Conservation* 17: 25–62.
- Kitchener, D.J., Chapman, A., Muir, B.G. & Palmer, M. 1980 'The Conservation Value for Mammals of Reserves in the Western Australian Wheatbelt: Some Implications for Conservation' *Biological Conservation* 18: 179–207.
- Kitchener, D.J., Dell, J., Muir, B.G. & Palmer, M. 1982 'Birds of Western Australian Wheatbelt Reserves: Implications for Conservation' *Biological Conservation* 22: 127–163.
- Kitchener, D.J. & How, R.A. 1982 'Lizard Species in Small Mainland Habitat Isolates and Islands off South-Western Western Australia' *Australian Wildlife Research* 9: 357–363.
- Longman, V.M. & Keighery, B.J. (eds) 2002 *Tuart (Eucalyptus gomphocephala) and Tuart Communities* Wildflower Society of Western Australia, Perth.
- Low, Tim 2002 *The New Nature: Winners and Losers in Wild Australia* Penguin Books Australia, Camberwell, Victoria.
- Main, A.R., 1987 'Management of Remnants of Native Vegetation: A Review of the Problems and the Development of an Approach with Reference to the Wheatbelt of Western Australia' in Saunders, D.A., Arnold, G.W., Burbidge, A.A. & Hopkins, A.J.M. (eds) *Nature Conservation: The Role of Remnants of Nature Vegetation* Beatty & Sons, Chipping Norton, Surrey, pp 1–13.
- Mattiske, E.M. & Havel, J.J. 1998 *Vegetation Complex Mapping for the Regional Forest Agreement Area and for the Swan Coastal Plain in the Busselton Area* unpublished report and maps prepared for the Department of Conservation and Land Management & Environment Australia.

- May, J.E. & McKenzie, N.L. (eds) 2003 *A Biodiversity Audit of Western Australia's Biogeographical Subregions in 2002* Department of Conservation and Land Management, Perth.
- Native Vegetation Working Group 2000 *Final Report of the Native Vegetation Working Group Perth* (report of working group established by the Minister for Primary Industry to develop mechanisms that minimise the economic burden carried by individual landholders in the protection and retention of privately owned bushland in agricultural areas) Western Australian Government, Perth
- Recher, H.F. & Lim, L. 1990 'A Review of Current Ideas of the Extinction, Conservation and Management of Australia's Terrestrial Vertebrate Fauna' *Proceedings of the Ecological Society of Australia* 16: 287–301.
- Recher, H.F. & Serventy, D.L. 1991 'Long Term Changes in the Relative Abundances of Birds in Kings Park, Perth, Western Australia' *Conservation Biology* 5: 90–102.
- Saunders, D.A. 1989 'Changes in the Avifauna of a Region, District and Remnant as a Result of Fragmentation of Native Vegetation: the Wheatbelt of Western Australia: A Case Study' *Biological Conservation* 50: 99–135.
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E5.7 Noise and vibration

E5.6 Air quality

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Chapter E6

Environmental management guidelines for agricultural activities (Western Australian inter-organisation guidelines)

Environmental management for animal-based industries—dairy farm effluent (1998)

Environmental guidelines for new and existing piggeries (2000) copies available from the Department of Agriculture Western Australia

Environmental guidelines for the establishment and maintenance of turf and grassed areas (2001)

Application Kit for New Horticultural Development (Water and Rivers Commission, Department of Environmental Protection, Agriculture Western Australia & Swan River Trust 2001)

Environmental guidelines for horse facilities and activities (2002)

Guidelines for the environmental management of beef cattle feedlots in Western Australia (2002)

Code of practice for environmentally sustainable vegetable and potato production in Western Australia (2002)

Best environmental management practices for environmentally sustainable vegetable and potato production in Western Australia—A reference manual (2002)

Environmental management guidelines for vineyards (2002)

Western Australian guidelines for direct land application of biosolids and biosolids products (Draft 2002)

Environmental Code of Practice for Poultry Farms in Western Australia (Western Australian Broiler Growers Association et al. 2004)

Chapter E7

Websites

Agriculture Information Gateway for Australian Researchers (AGRIGATE)
www.agrigate.edu.au

Appeals Convenor (Office of)
www.appealsconvenor.wa.gov.au (for appeals under the Environmental Protection Act 1986)

Aqwest – www.aqwest.wa.gov.au

Australasian Legal Information Institute
www.austlii.edu.au (provides copies of legislation)

Australian Communications Authority
www.aca.wa.gov.au

Australian Greenhouse Office
www.greenhouse.gov.au

Australian Heritage Council
www.ahc.gov.au

Australian Heritage Directory
www.heritage.gov.au

Australian Natural Resources Atlas
www.ea.gov.au/anra/atlas_home.cfm

Australian Radiation Protection and Nuclear Safety Agency
www.arpansa.gov.au

Busselton Water Board
www.busseltonwater.gov.au

CSIRO Land and Water
www.clw.csiro.au

Department of Agriculture, Fisheries and Forestry (Commonwealth)
www.affa.gov.au

Department of Agriculture, Western Australia
www.agric.wa.gov.au

Department of Consumer and Employment Protection www.docep.wa.gov.au

Department of Environment and Conservation
www.dec.wa.gov.au contains nature base and Flora base

Department of Environment and Heritage (Commonwealth)
www.deh.wa.gov.au

Department of Fisheries
www.fish.wa.gov.au

Department of Health
www.health.wa.gov.au

Department of Indigenous Affairs
www.dia.wa.gov.au

Department of Industry and Resources
www.doir.wa.gov.au

Department for Planning and Infrastructure
www.dpi.wa.gov.au

East Perth Redevelopment Authority
www.epra.wa.gov.au

Environmental Defender's Office (Western Australia)
www.epra.wa.gov.au

Environmental Protection Authority
www.epa.wa.gov.au

Environmental Protection Authority (South Australia)www.epa.sa.gov.au

Fire and Emergency Services Authority
www.fesa.wa.gov.au

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www.heritage.wa.gov.au

International Commission on Non-Ionizing Radiation Protection
www.icirp.de

Land and Water Australia
www.iwrrdc.gov.au

Land Information Authority
www.landgate.wa.gov.au

Main Roads Western Australia
www.mainroads.wa.gov.au

National Action Plan for Salinity and Water Quality www.napswq.gov.au

National Dryland Salinity Program
www.ndsp.gov.au

National Health and Medical Research Council of Australia
www.health.gov.au

National Land and Water Resources Audit
www.nlwra.gov.au

National Oceans Trust
www.oceans.gov.au

National Trust of Western Australia
www.ntwa.com.au

Natural Heritage Trust
www.nht.gov.au

Natural Resource Management Council
www.nrm.org.au (provides links to Western Australian regional natural resource management groups)

Natural Resource Management Ministerial Council and the Primary Industries Ministerial Council
www.mincos.gov.au

Public Transport Authority
www.pta.wa.gov.au

Ramsar Convention on Wetlands
www Ramsar.org

Standards Australia
www.standards.com.au

State Law Publisher
www.sip.wa.gov.au

Swan River Trust
www.swanrivertrust.wa.gov.au

Water Corporation
www.watercorporation.com.au

Western Australian Land Information System
www.walis.wa.gov.au

Western Australian Local Government Association
www.walga.asn.au

Western Australian Museum
www.museum.wa.gov.au (contains FaunaBase)

Western Australian Planning Commission
www.wapc.wa.gov.au

Western Australian Speleological Group
www.wasg.iinet.net.au

Western Power
www.wpcorp.com.au

World Conservation Union (IUCN)
www.redlist.org

World Health Organization
www.who.int



**Environmental
Protection Authority**

Environmental Guidance for Planning and Development

Appendices

Appendices

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Appendix 1

Glossary

Terms below that are marked with an asterisk (*) have a special meaning in the *Environmental Protection Act 1986 (EP Act)* or its regulations. The reader should refer to the legislation for the legal meaning as the glossary entry is indicative only.

A-weighted sound level—A sound level that includes a weighting in the measurement of the sound to approximate the frequency response of the normal human ear.

Acid sulfate soils—Acid sulfate soils are naturally occurring soils and sediments containing sulfide minerals, predominantly pyrite (an iron sulfide). When undisturbed below the watertable, these soils are benign and not acidic (potential acid sulfate soils). However if the soils are drained, excavated or exposed by lowering of the water table, the sulfides will react with oxygen to form sulfuric acid (www.environment.wa.gov.au).

Adequate (see **comprehensive, adequate and representative (CAR) reserve system**)

Air toxics—‘Gaseous, aerosol or particulate pollutants that are present in the air in low concentrations with characteristics such as toxicity or persistence so as to be a hazard to human, plant or animal life’ (www.deh.gov.au). A National Environment Protection Measure (NEPM) has been developed for the following air toxics: benzene, formaldehyde, polycyclic aromatic hydrocarbons, toluene and xylenes.

Area of high conservation significance—A naturally vegetated or non-vegetated area including water bodies, bare ground and/or rock outcrops where conserving the environmental values of the area is important to meet the objective of the EP Act.

Assemblage—A collection of co-occurring populations of organisms (Lewis 1977).

Assessed scheme*

- a. Means a scheme which has been assessed under Division 3 of Part IV EP Act and in respect of which a statement has been delivered to the responsible authority under s48F(2)(a)
- b. For the purposes of Part IV EP Act, includes a scheme:
 - (i) in respect of which the responsible authority has been informed under s48A(1)(a)

- (ii) in respect of which the responsible authority has not been informed under s48A(1)(a), (b) or (c) within 28 days after the referral of that scheme to the Authority under the relevant scheme Act; or
- (iii) which is a town planning scheme, or an amendment to a town planning scheme, in respect of which:
 - (A) s35A *Metropolitan Region Town Planning Scheme Act 1959* has been complied with to the extent, if any, necessary in relation to an amendment to the Metropolitan Region Scheme; or
 - (B) s18 *Western Australian Planning Commission Act 1985* has been complied with to the extent, if any, necessary in relation to a regional planning scheme, or an amendment to a regional planning scheme,

which amendment to the Metropolitan Region Scheme, or regional planning scheme, or amendment to a regional planning scheme, is a scheme referred to in paragraph (a) or subparagraph (i) or (ii)

- c. Does not include a scheme in respect of which the responsible authority has been advised under s48A(2)(b).

Assigned noise level*—The maximum noise levels deemed acceptable pursuant to the *Environmental Protection (Noise) Regulations 1997* at **noise-sensitive premises**, commercial premises and industrial premises are called ‘assigned noise levels’. Assigned noise levels are reproduced in Attachment C4-2. Acceptable noise is identified in terms of the $L_{A\max}$, L_{A1} , and L_{A10} assigned levels, and takes into account influencing factors. These terms are defined in Attachment C4-2.

Attribute (in relation to natural areas)—A characteristic associated with ecosystem health or which supports a use or value associated with public benefit, amenity, safety, health or aesthetic enjoyment.

Baseline, benchmark—A starting or reference point.

Beneficial use* (also see **environmental value**)—Means a use of the environment, or of any portion thereof, which is:

- a. conducive to public benefit, public amenity, public safety, public health or aesthetic enjoyment and which requires protection from the effects of emissions or **environmental harm**; or
- b. identified and declared under s35(2) EP Act to be a beneficial use to be protected under an approved policy.

Benthic primary producer habitat—The natural home of organisms living upon or in the sediment of the sea which can manufacture organic substances (food) from simple inorganic substances.

Best available technology—Best available technology is the best technology available at a scale relevant to the proposal. It is relevant to the definition of maximum extent achievable and, as such, it does not include consideration of costs or other matters. The definition of best available technology is deliberately distinct from the definition of best practicable measures which does consider other matters, including costs (EPA 2003c).

Best practicable measures—Best practicable measures incorporate technology and environmental management procedures which are practicable having regard to, among other things, local conditions and circumstances (including costs), and to the current state of technical knowledge, including the availability of reliable, proven technology (EPA 2003c).

Best practice—The EPA's concept of 'best practice' is described in EPA Guidance Statement No. 55 (EPA 2003c). The thrust of the Guidance Statement is that:

- a. All relevant environmental quality standards must be met.
- b. Common pollutants should be controlled by proponents adopting best practicable measures to protect the environment.
- c. Hazardous pollutants (for example, dioxins) should be controlled to the maximum extent achievable which involves the most stringent measures available and best available technology. For a number of very hazardous and toxic pollutants, costs are not taken into account.
- d. There is a responsibility for proponents not only to minimise adverse impacts, but also to improve the environment through rehabilitation and offsets where practicable.

Biodiversity, biological diversity—The variety of all life forms – the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part. Biodiversity is not static, but constantly changing. It is increased by genetic change and evolutionary processes and reduced by processes such as habitat degradation, population decline, and extinction (Commonwealth of Australia 1996).

Biodiversity has two key aspects:

- a. its intrinsic value at the genetic, individual species, and species assemblages levels
- b. its functional value at the ecosystem level.

Biodiversity hotspots (global)—Regions that contain a great diversity of endemic species and at the same time have been significantly impacted and altered by human activities. There are 25 biodiversity hotspots around the world. The only Australian representative is the South West of Western Australia (Department of Conservation and Land Management 2004).

Biodiversity hotspots (national)—Areas that are rich in plant and/or animal species, particularly endemic species, and are also under immediate threat from impacts such as land clearing, habitat modification, development pressures, salinity, weeds and introduced animals. There are a total of 15 hot spots in Australia, eight of which are found in Western Australia (Department of Conservation and Land Management 2004).

Bioregions, biogeographic regions—Interim Biogeographic Regionalisation for Australia (IBRA) is a framework for conservation planning and sustainable resource management. IBRA bioregions represent a landscape based approach to classifying the land surface from a range of data on environmental attributes including climate and geomorphology (Thackway and Cresswell 1995 and updates, www.deh.gov.au).

Biota—The plants, animals and micro-organisms of a region.

Broad scale planning—In this guidance statement, a general term for planning processes that set out broad objectives, intended uses and planning procedures for large areas of land. Broad scale planning tools include strategic and structure plans, region schemes and their amendments, town planning schemes and their amendments, and overarching planning policies.

Buffer—In relation to potentially polluting activity (for example, some industries and infrastructure), 'the area within which sensitive land uses are prohibited or special measures are necessary to ameliorate the impacts of industry or infrastructure' (WAPC 2004c).

In relation to a significant natural area, the adjoining area in which general development is prohibited and special measures are applied to maintain the **ecosystem health** of the significant natural area.

Bush Forever sites—Regionally significant areas of bushland on the Swan Coastal Plain portion of the Perth Metropolitan Region designated for protection under Bush Forever (Government of Western Australia 2000b and updates).

Bushland—Land on which there is vegetation which is either a remainder of the natural vegetation of the land, or, if altered, is still representative of the structure and floristics of the natural vegetation, and provides the necessary habitat for native fauna (Government of Western Australia 2000b).

CAMBA—The China-Australia Migratory Birds Agreement is an agreement between the Government of Australia and the Government of the People's Republic of China for the protection of migratory birds and their environment (Commonwealth of Australia 1995b).

CAR reserve system (see comprehensive, adequate and representative (CAR) reserve system)

Catchment—The catchment of a wetland or waterway is the area around the wetland or waterway that contributes surface run-off or groundwater to the wetland or waterway.

Catchment management—The management of natural resources and land uses, development and activities that directly, indirectly or cumulatively can impact on the health and integrity of the catchment.

Cleaner production—The continuous application of an integrated preventive environmental strategy to processes, products and services to increase eco-efficiency and reduce risks to humans and the environment (Waste 2020 TaskForce 2001).

Clearing* __Means

- a. the killing or destruction of
- b. the removal of
- c. the severing or ringbarking of trunks or stems of or
- d. the doing of any other substantial damage to
- e. some or all of the native vegetation in an area, and includes the draining or flooding of land, the burning of vegetation, the grazing of stock, or any other act or activity, that causes:

- f. the killing or destruction of
- g. the severing of trunks or stems of; or
- h. any other substantial damage to,
- i. some or all of the native vegetation in an area.

Comprehensive, adequate and representative (CAR) reserve system—A reserve system characterised by the following (Department of Conservation and Land Management 2004):

Comprehensive: includes the full range of ecosystems recognised at an appropriate scale within and across each bioregion

Adequate: maintains the ecological viability and integrity of populations, species and communities

Representative: areas that are selected for inclusion in reserves reasonably reflect the biotic diversity of the ecosystems from which they derive.

Condition (in relation to vegetation)—Condition is a rating given to vegetation to categorise disturbance related to human activities. This rating refers to the degree of change in the structure, density and species present in vegetation in relation to undisturbed vegetation of the same type. A widely used condition system is that of Keighery (1994). It uses the following ratings:

1. **Pristine:** No obvious signs of disturbances.
2. **Excellent:** Vegetation structure intact; disturbance affecting individual species and weeds are non-aggressive.
3. **Very Good:** Vegetation structure altered; obvious signs of disturbance.
4. **Good:** Vegetation structure significantly altered by obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it.
5. **Degraded:** Basic vegetation structure severely impacted by disturbance. Scope for regeneration of vegetation structure, but not to a state approaching good condition without intensive management.
6. **Completely Degraded:** The structure of the vegetation is no longer intact and the area is completely or almost completely without native species.

Other condition ratings used commonly are described in Government of Western Australia (2000d).

Conservation area*—A conservation park, national park, nature reserve, marine nature reserve, marine park or marine management

area within the meaning of the *Conservation and Land Management Act 1984* or any other land or waters reserved, protected or managed for the purpose of, or purposes including, nature conservation.

Conservation category wetland—Conservation category wetlands support a high level of environmental values. These are the highest priority wetlands and the management objective is the preservation of wetland attributes and functions.

Conservation estate—Land under the care and control of the Conservation Commission and managed by the Department of Conservation and Land Management (CALM). This includes National Parks, Nature Reserves, Conservation Parks and s5(1)(g) or s5(1)(h) *Conservation and Land Management Act 1984* reserves.

Constrained area—An area where there is a reasonable expectation that development will be able to proceed. This may include urban, urban deferred or industrial zoned land or land with existing development approvals.

Contaminated—‘Contaminated’, in relation to land, water or a site, means having a substance present in or on that land, water or site at above background concentrations that presents or has the potential to present, a risk of harm to human health, the environment or any environmental value (*Contaminated Sites Act 2003*).

Criteria (see **environmental criteria**)

Criteria pollutants—One of two groups of air pollutants (the other is air toxics). They are known to have harmful effects on our health. The criteria pollutants are carbon monoxide, lead, nitrogen dioxide, ozone, particles and sulfur dioxide.

Critical environmental assets—These are the most important environmental assets in the State that should be protected and conserved. The concept of critical environmental assets was introduced in EPA (2004c). An interim list of critical environmental assets is in Chapter A2.

Critically endangered—A taxon is critically endangered when it is facing an extremely high risk of extinction in the wild.

Dampland—A seasonally waterlogged basin wetland (EPA 2004d).

dB—A unit of sound called the decibel. The decibel describes the sound pressure level of a noise source. It is a logarithmic scale referenced to the threshold of hearing. A 10 dB increase is perceived by a listener as a doubling of loudness.

Decision-making authority*—Means a public authority empowered by or under:

- a. a written law; or
- b. any agreement:
 - I. to which the State is a party and
 - II. which is ratified or approved by an Act

to make a decision in respect of any proposal and, in Division 2 of Part IV EP Act, includes, in relation to a particular proposal, any Minister prescribed for the purposes of this definition as being the Minister responsible for that proposal.

Declared Rare Flora—Species protected under the *Wildlife Conservation Act 1950*, as identified in the current listing.

Deferred factor—Deferred factor is a non-statutory term applied by the EPA in relation to an environmental factor relevant to a scheme when the EPA considers that the environmental factor does not need to be assessed in detail at the time the scheme is formulated, but needs to be adequately considered and protected at an appropriate later stage of planning. The term is discussed in A2.2.

Derived proposal*—The EPA may declare a **proposal** referred to the EPA under s38 EP Act to be a derived proposal if it considers that the proposal was identified in a **strategic proposal** that has been assessed under Part IV EP Act.

Development—As defined in the *Town Planning and Development Act 1928*. The term ‘development’ includes ‘use’.

Ecological community—A naturally occurring biological **assemblage** that occurs in a particular type of habitat. The scale at which ecological communities are defined will often depend on the level of detail in the information source (EPA 2004f).

Ecological linkage—A network of native vegetation that maintains some ecological functions of natural areas and counters the effects of habitat fragmentation.

Ecological sustainability—The use of natural resources to meet society’s needs in ways that ensure that the health and diversity of ecosystems are maintained and do not reduce the capacity of future generations to meet their needs (EPA 2004e).

Ecological water requirements—The water regimes needed to maintain ecological values of water-dependent ecosystems at a low level of risk.

Ecology—The study of the inter-relationships between living organisms and their environment.

Ecosystem—A dynamic complex of plant, animal, fungal and micro organism communities and the associated non-living environment interacting as an ecological unit. Non-living factors include climate, atmosphere and the geosphere (EPA 2004f).

Ecosystem functions, ecosystem processes—Inter-connected processes that sustain the biodiversity typical of a given ecosystem, and drive the self-directed development of that ecosystem. Such processes involve all components of ecosystems, living and non-living (EPA 2004f).

Ecosystem health condition*, ecosystem health—Means a condition of the ecosystem which is:

- a. relevant to the maintenance of ecological structure, ecological function or ecological process and which requires protection from the effects of emissions or of **environmental harm**; or
- b. identified and declared to be protected under an approved policy.

Ecosystem management approach—A management approach that achieves ‘the integration of ecological, economic, and social principles to manage biological and physical systems in a manner that safeguards the ecological sustainability, natural diversity, and productivity of the landscape’ (EPA 2004d).

Ecosystem services—Essential processes provided by the environment that are critical to life on Earth, including soil formation, nutrient cycling, clean water supply, pollination and waste assimilation (EPA 2004e).

Edge effects—The deterioration of the health of natural areas near the interface with developed or cleared areas. The edges of natural areas are prone to weed infestation, pests and diseases, exposure to the weather, altered drainage and watertable regimes, trampling and other impacts.

Effluent—Wastewater that has been used for some purpose and would normally be treated and discarded. It usually contains pollutants.

Electromagnetic field—‘An electromagnetic field (EMF) has two components: an electric field and a magnetic field. An electric field exists when two objects have a voltage difference between them. For example, there is an electric field between a power line and the ground below because the power line is at a large voltage relative to the ground. A magnetic field exists when electric current flows through a wire. Thus magnetic fields surround the power lines conducting current from the power station to our homes. Normally, both electric and magnetic fields

are present, so we can use the term EMF to mean either.’ (Health Department of Western Australia 1997)

Electromagnetic radiation—Energy transmitted through space or through a material medium in the form of electromagnetic waves. The electromagnetic spectrum includes X rays, ultraviolet radiation, visible light, infrared radiation, microwaves and radio waves (Parker 1984, Macmillan 1994).

Emission*—Means:

- a. discharge of waste
- b. emission of noise, odour or electromagnetic radiation or
- c. transmission of electromagnetic radiation.

Endemic (as in ‘short-range endemic’)—A species with a naturally small distribution covering less than 10,000 square kilometres, although the actual area of occupancy maybe far less (EPA 2004h from Harvey 2002).

Enhanced greenhouse effect (also see **greenhouse gases**)—The alteration of the world’s climate system caused by increasing levels of certain gases in the Earth’s atmosphere. These gases (mainly from fossil fuel use, ruminant digestion and land clearing) cause higher average air temperatures in the lower atmosphere, changed rainfall patterns, warmer oceans and rising sea levels. Impacts are experienced globally (Western Australian Greenhouse Task Force 2004).

Environment*—Living things, their physical, biological and social surroundings, and interactions between all of these. The social surroundings of man are his aesthetic, cultural, economic and social surroundings to the extent that those surroundings directly affect or are affected by his physical or biological surroundings.

Environmental criteria—Numerical values or narrative statements that serve as benchmarks to determine whether a more detailed assessment of environmental quality or a management response is required.

Environmental factor—A part or an aspect of the environment.

Environmental guidelines—Numerical values or narrative statements which if met indicate there is a high probability that the associated environmental objective has been achieved.

Environmental harm*—Means direct or indirect:

- a. harm to the environment involving removal or destruction of, or damage to:
 - I. native vegetation or
 - II. the habitat of native vegetation or indigenous aquatic or terrestrial animals

- b. alteration of the environment to its detriment or degradation or potential detriment or degradation
- c. alteration of the environment to the detriment or potential detriment of an environmental value or
- d. alteration of the environment of a prescribed kind.

Environmental impact assessment—An orderly and systematic process for evaluating a scheme or a proposal, including its alternatives where relevant, and its effect on the environment, including the mitigation and management of those effects.

Environmental issue—Any matter related to the protection of the environment.

Environmental management—A concept of care applied to localities, regions, catchments, natural resources, areas of high conservation values, cleaner processing and recycling systems, waste handling and disposal, pollution control generally, landscaping and aesthetics and enhancement of amenities. In general, it means the efficient administration of environmental policies and standards. It involves the identification of objectives, the adoption of appropriate mitigation measures, the protection of ecosystems, the enhancement of the quality of life for those affected, and the minimisation of environmental costs (Gilpin 1996).

Environmental management plan, environmental management program—In this guidance statement, the term 'environmental management plan' is used where the purpose is to describe management actions, schedules, resources and responsibilities for achieving environmental objectives and targets with respect to a particular site or environmental factor.

Some projects require the preparation and implementation of a number of environmental management plans, to address a range of potential environmental impacts, for example, noise, vegetation, dust. Together, a group of plans may constitute an 'environmental management program'.

Environmental management system—Part of the overall management system that includes organisational structure, planning activities, responsibilities, practices, procedures, processes and resources for developing, implementing, achieving, reviewing and maintaining the environmental policy (AS/NZS ISO 14004:2004).

Environmental objective, environmental quality objective—An environmental goal or vision, arising from the need to protect or enhance environmental values, and which is quantified where practicable.

Environmental offset—Any environmentally beneficial activities undertaken to counterbalance an environmental impact or harm, with the aim of achieving a 'no net environmental loss' or 'net environmental benefit' outcome (EPA 2004c).

Environmental quality standard—A numerical value or narrative statement beyond which the associated environmental quality objective has not been achieved and a management response is triggered.

Environmental value*—Means:

- a. a beneficial use of the environment (including social and economic values that derive from the environment); or
- b. an ecosystem health condition.

NB: In some contexts (not the EP Act), the term 'environmental value' is applied only to an ecosystem health condition.

Environmental water provisions—The water regimes that are provided as a result of the water allocation decision-making process, taking into account ecological, social and economic impacts. They may meet in part or in full the ecological water requirements.

Estuary—An enclosed or semi-enclosed coastal body of water having an open or intermittently open connection to marine waters and fresh input from land run-off which measurably reduces salinity. They characteristically support a high level of biological productivity. Many species of birds, fish, invertebrates and mammals depend on estuaries for feeding, spawning and nursery grounds.

Eutrophication—The accumulation of nutrients in a water body.

Fauna—Animal species.

Fauna assemblage—A collection of animal species inhabiting a particular area (EPA 2004h).

Flood fringe—Term used in Western Australia to mean the portion of the **floodplain** outside the **floodway** where, for the purposes of flood management, some development may occur. The area is generally covered by still or very slow moving waters during the 100-year flood (WRC 2001c).

Floodplain—The extent of the land near a waterway that may be flooded.

Floodway—Term used in Western Australia to mean the portion of the **floodplain** where no development or filling should occur as this area is expected to carry the main flood.

Flora—All the vascular plant **taxa** (including species, subspecies, varieties, hybrids and ecotypes) in a given area or epoch (EPA 2004f).

Floristic community type—Floristic assemblage as defined by Gibson et al. (1994) and Department of Environmental Protection (1996b). The presence or absence of individual taxa in standard areas (plots, sites, quadrats) is used to define floristic groupings based on shared species (EPA 2003a).

Foreshore—The land that adjoins or directly influences a waterway or estuary. The term is used in several ways, for example, it may mean the area of transition between the edge of a waterway or estuary and the adjacent upland, or the area that is or should be managed to protect the values of the water body.

Foreshore buffer—The area along each side of a waterway or estuary that is managed primarily to protect the ecological and hydrological values of the waterway or estuary.

Foreshore reserve—Land adjoining a waterway or estuary that is designated on the land title as a reserve for foreshore, conservation, or similar purposes, or is designated on a planning scheme map as a reservation for open space, conservation or similar purpose.

Fringing vegetation, riparian vegetation—The vegetation adjacent to a water body and directly dependent on the proximity of the water body. Fringing vegetation can include both wetland and dryland vegetation. Fringing vegetation helps to maintain the integrity of the water body by providing habitat for many aquatic and terrestrial species, stabilising the water body banks, dissipating water energy, providing ecological corridors, and limiting the export of sediment and nutrients.

Geoheritage—The natural geological features in the landscape and their cultural values.

Greenhouse effect (see **enhanced greenhouse effect**)

Greenhouse gases—Greenhouse gases trap heat and are a natural part of the atmosphere. However, human actions - particularly burning fossil fuels (coal, oil and natural gas) and land clearing - are increasing the concentrations of some greenhouse gases. Humans have most impact on carbon dioxide, methane and nitrous oxide. Water vapour is the most abundant greenhouse gas, but human activities have little direct impact on its amount in the atmosphere. Various artificial chemicals such as halocarbons make a small contribution to climate change (from www.greenhouse.gov.au).

Groundwater—Water found under the land surface that occupies the pores and crevices of soil or rock.

Habitat—The natural environment of an organism or a community, including all biotic and abiotic elements; a suitable place for it to live. The term 'habitat' has been applied at a range of scales. Vegetation can become a reasonable surrogate for outlining habitat when its main components, structure and the associated landform are also described (EPA 2004h).

Hazardous event—An event which can cause harm to employees, the public or the environment (EPA 2000g).

Hazardous industrial plant—Plant used for the storage, transportation (including pipelines, road or rail) or processing of hazardous substances which may pose a significant risk to the employees, the surrounding community and the environment (EPA 2000g).

Haze—A reduction in atmospheric visibility due to the light-scattering effect of aerosols in the atmosphere (Meagher 1991).

High value assets—Those environmental assets that are in good to excellent condition, are considered valuable by the community and/or government, but are not identified as critical environmental assets. The concept is described in EPA (2004c).

Hydric soil—Soil that has formed under conditions of saturation, flooding or ponding long enough to develop anaerobic conditions in the upper part. The concept of hydric soils includes soils developed under sufficiently wet conditions to support the growth and regeneration of hydrophytic vegetation (adapted from www.soils.usda.gov).

Hydrology—The scientific study of the water found in and on land, including wetlands, waterways, wells, snow and ice. Hydrology includes the methods for detecting, treating and conserving water (Meagher 1991).

Impact (environmental)—The effect that a human-caused or natural activity has on living organisms and their non-living environment that can either be adverse or beneficial.

Indirect impact—Impact that occurs as a secondary or tertiary effect of a development or action.

Industrial ecology—This is an approach that applies ecological and systems engineering principles to integrate the production and consumption aspects of design, production, use and decommissioning or disposal of products and services. It aims to minimise

the environmental impact, while maximising utilisation of resources, energy and capita. It reflects natural systems where nothing useful is lost or wasted (Department of Environment & Waste Management Board 2003).

Infrastructure—Includes facilities for the following services that support land use and development: power, water, telecommunications, wastewater, roads, railways, ports, freight terminals and airports.

Inlet (see *estuary*)

Integrated water cycle management (see *water cycle management*)

JAMBA—The Japan–Australia Migratory Birds Agreement is an agreement between the Government of Japan and the Government of Australia for the protection of migratory birds in danger of extinction and their environment (Commonwealth of Australia 1995a).

Karst—‘A distinctive style of terrain that is characterised by individual landform types and landform assemblages that are largely the product of rock material having been dissolved by natural waters to a greater degree than in most landscapes’ (Watson et al. 1997).

L_{A1}—The **A-weighted sound level** which is not to be exceeded for more than 1% of the time, that is, for more than one minute in 100 minutes.

L_{A10}—The **A-weighted sound level** which is not to be exceeded for more than 10% of the time, that is, for more than ten minutes in 100 minutes.

L_{Aeq}—The equivalent steady-state **A-weighted sound level** which in a specified time period contains the same acoustic energy as the time-varying level during the same period.

L_{Amax}—The **A-weighted sound level** (slow) which is not to be exceeded at any time.

Lake—Permanently inundated basin wetland.

Land capability—The inherent qualities of the land resource and its components (EPA 2004e).

Land degradation—The decline in the condition or quality of the land as a consequence of human activities (Government of Western Australia 1998a).

For the purposes of the *Soil and Land Conservation Act 1945* land degradation includes:

- soil erosion, salinity, eutrophication and flooding and
- the removal or deterioration of natural or introduced vegetation that may be detrimental to the present or future use of land.

Land suitability—Land suitability takes **land capability** information and other information (such as rainfall, environmental sensitivity) and looks at the overall suitability of a piece of land to accommodate a particular kind of development. It is useful for site selection and can also underpin the manner in which a particular type of development is carried out, so that the environmental limitations or constraints are fully recognised (EPA 2004e).

Land use—The active or passive use to which the land is put by its owner, lessee, manager or occupier.

Landform—A combination of slope and elevation producing a particular shape and form of the land surface.

Landscape—The appearance of the land whether natural or altered, including its shape, texture and colours.

Lentic—Relating to still water systems (i.e. lakes and sumplands).

Local area planning—In this guidance statement, means detailed planning for local areas. Local area planning processes include subdivision and development applications, town planning schemes and their amendments, detailed local structure plans and local planning policies.

Material environmental harm*—
Environmental harm that:

- is neither trivial nor negligible or
- results in actual or potential loss, property damage or damage costs of an amount, or amounts in aggregate, exceeding the threshold amount.

Maximum extent achievable—The degree of reduction in the emission of wastes which is equivalent to or greater than that which can be achieved by the application of **best available technology** or practices. In some circumstances it may require the application of new, original or innovative control technology or practices to a particular source. It must be effective and consistent with the level of risk that exists, without undue regard to costs. Maximum extent achievable measures are only intended to apply to hazardous pollutants. They are not intended to apply at pollutant concentrations that do not pose a creditable risk (from EPA 2003c).

Metropolitan Region Scheme—The Metropolitan Region Scheme made pursuant to the **Metropolitan Region Town Planning Scheme Act 1959** published in the **Government Gazette** of 9 August 1963 and as amended from time to time.

Mitigation (environmental)—Refers to a sequence of considerations designed to help manage environmental impacts, which includes (in order of preference) avoid, minimise, rectify, reduce and offset (EPA 2004c).

Monitoring (environmental)—The systematic act of collecting and analysing environmental data to provide ongoing information about the health or condition of the environment.

Multiple use wetland—Wetland with few important ecological attributes and functions remaining.

Native vegetation*—Indigenous aquatic or terrestrial vegetation, including most dead vegetation, but does not include vegetation in a plantation, nor, for the purposes of Division 2 Part V of the EP Act, most vegetation that was intentionally sown, planted or propagated.

Natural area—Naturally vegetated area or non-vegetated area such as a water body (generally a river, lake or estuary), bare ground (generally sand or mud), rock outcrop (EPA 2004f).

Natural resource management—The ecologically sustainable management of the land, water (fresh and marine), air and biodiversity resources of the State for the benefit of existing and future generations, and for the maintenance of the life support capability of the biosphere (EPA 2004b).

NEPM*—A national environment protection measure within the meaning of the *National Environment Protection Council (Western Australia) Act 1996*.

Noise*—Section 3 EP Act defines noise as 'vibration of any frequency, whether transmitted through air or any other physical medium'. The term noise in Western Australia thus includes audible frequencies, as well as frequencies below the audible range (infrasound) and above the audible range (ultrasound). It includes 'felt' vibration and vibration re-generated as noise. However, noise most commonly refers to unwanted or unpleasant sound.

Noise-sensitive premises*—The *Environmental Protection (Noise) Regulations 1997* define all premises other than commercial and industrial premises (including infrastructure) as noise-sensitive premises.

Nutrient—Any chemical that provides nourishment for a living organism. Well-known nutrients include the macro-nutrients nitrogen, phosphorus and potassium.

Offsets (environmental)—Any environmentally beneficial activities undertaken to counterbalance an environmental impact or harm, with the aim of achieving a 'no net loss' or 'net environmental benefit' outcome (EPA 2004c).

Oligotrophic—A body of water low in nutrients.

Ozone—A naturally occurring molecular gas consisting of three oxygen atoms. Ozone is produced by electric discharges in the presence of oxygen, and is therefore a by-product of modern technology as well as from natural atmospheric electrical activity. Ozone is phototoxic and can also severely irritate and damage the respiratory system of animals (Meagher 1991).

Palusplain—Seasonally waterlogged flat wetland.

Photochemical smog—Photochemical smog is an atmospheric condition made up mainly of ozone, nitrogen dioxide and peroxy acetyl nitrate. The constituents of photochemical smog that have an adverse effect on people and the environment are known collectively as oxidants or photochemical oxidants. Photochemical oxidant is formed by the action of sunlight on mixtures of nitrogen oxides and non-methane hydrocarbons. High temperatures can increase the rate of formation (Department of Environmental Protection 2000a).

Phreatophyte—A plant with roots long enough to reach the watertable and which can draw its water from the groundwater supply.

Plantation*—One or more groups of trees, shrubs or plants intentionally sown, planted or propagated with a view to commercial exploitation.

Point source pollution—Pollution resulting from a specific activity or land use, as opposed to pollution resulting from the cumulative emissions of many individual activities.

Pollution*—Direct or indirect alteration of the environment:

- a. to its detriment or degradation
- b. to the detriment of an environmental value or
- c. of a prescribed kind that involves an emission.

Practicable*—Means reasonably practicable having regard to, among other things, local conditions and circumstances (including costs) and to the current state of technical knowledge.

Precautionary principle—Principle applied to err on the side of caution when the prediction of environmental impacts is uncertain.

Prescribed premises*—Premises prescribed for the purposes of Part V EP Act as specified in Schedule 1 *Environmental Protection Regulations 1987*. The legislation specifies when works approvals, licenses and/or registration are required. Works approvals and licenses are intended to prevent or minimise the potential for pollution.

Priority Fauna—Conservation significant animal species listed by CALM's Threatened Species Consultative Committee but which are not currently listed under s14(2)(ba) *Wildlife Conservation Act 1950* as Specially Protected Fauna (EPA 2004h).

Priority Flora—Plant taxa that are under consideration as threatened flora but are in need of further survey to adequately determine their status, or are adequately known but require monitoring to ensure that their security does not decline (EPA 2004f). Priority Flora lists are maintained by CALM.

Proponent*—In relation to a **proposal**, means the person who or which is responsible for the proposal, or the public authority on which the responsibility for the proposal is imposed under another written law.

Proposal* (see significant proposal)—A project, plan, program, policy, operation, undertaking or development or change in land use, or amendment of any of the foregoing, but does not include scheme.

Proposal under an assessed scheme*—An application under an assessed scheme or an Act for the approval of any development or subdivision of any land within the area to which the assessed scheme applies.

Public drinking water source areas—Areas proclaimed by legislation to protect drinking water source catchments. They include:

- a. **Underground Water Pollution Control Areas** (proclaimed over shallow groundwater stores under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909*)
- b. **Catchment Areas** (proclaimed over the surface water catchments of dams under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or the *Country Areas Water Supply Act 1947*)
- c. **Water Reserves** (declared over potential surface water and groundwater catchments or existing groundwater public drinking water sources under the *Metropolitan Water Supply, Sewerage and Drainage Act 1909* or the *Country Areas Water Supply Act 1947*).

Radiation—'Radiation is energy that travels through space, in the form of particles or electromagnetic waves. Light from the sun is a form of radiation, X-rays used in medicine are another. The word 'radiation' refers to many forms of energy such as light, heat, radio waves, microwaves, X-rays and radar. Radiation is also the general name given to the kind of energy given off by radioactive atoms such as uranium and thorium. This type of radiation is called ionising radiation because it has enough energy to remove electrons from atoms.' (Operators' Radiation Committee 1998)

Ramsar Convention—The Ramsar Convention on Wetlands, signed in Ramsar Iran in 1971, is an intergovernmental treaty that provides the framework for national action and international cooperation for the conservation and wise use of wetlands and their resources.

Rare Flora (see **Declared Rare Flora**)

Red Books (EPA Red Books)—The four reports (in red covers) that set out the recommendations of the EPA for conservation reserves in each of the 12 **Systems** of Western Australia. They were published in 1975 (Systems 4, 8-12), 1976 (Systems 1, 2, 3, 5), 1980 (System 7) and 1983 (System 6).

Regenerated noise—The noise that is radiated into a room by the floor, walls and ceiling vibrating in response to vibrations in the ground.

Regional parks—Areas of regional open space that are identified by planning procedures as having regionally significant conservation, recreation and landscape values. Regional parks comprise a number of different land tenures including reserved Crown land, unallocated Crown land, freehold land acquired by the Crown and other freehold land.

Regionally significant natural area—A component of remnant native vegetation, rock outcrop or water body that collectively aims to form a comprehensive, adequate and representative system of conservation areas. In order to establish whether an area falls into this category it needs to be part of the existing or proposed conservation system or to meet (in part or whole) a range of agreed criteria (EPA 2003a).

Representative (see **comprehensive, adequate and representative (CAR) reserve system**)

Reserve—Any land reserved for a public purpose.

Resource enhancement wetland—A wetland which may have been partially modified but still supports substantial ecological attributes and functions.

Responsible authority*—In relation to:

- a. a scheme which is:
- I. prepared under the East Perth Redevelopment Act 1991, means the East Perth Redevelopment Authority established by that Act
 - (ia) prepared under the Midland Redevelopment Act 1999, means the Midland Redevelopment Authority established by that Act
 - (ib) prepared under the Hope Valley–Wattleup Redevelopment Act 2000, means the Western Australian Land Authority established by s5(1) Western Australian Land Authority Act 1992
 - II. prepared under the Subiaco Redevelopment Act 1994, means the Subiaco Redevelopment Authority established by that Act
 - III. prepared under the Metropolitan Region Town Planning Scheme Act 1959, means the Western Australian Planning Commission
 - IV. a regional planning scheme, or an amendment to a regional planning scheme, means the Western Australian Planning Commission
 - V. a town planning scheme, or an amendment to a town planning scheme, means the local government which is responsible for the town planning scheme or amendment; or
 - VI. a statement of planning policy to which s5AA(8) Town Planning and Development Act 1928 applies, or an amendment to such a statement, means the Western Australian Planning Commission
- or
- b. subdivision which is:
- VII. an activity requiring approval under Part III of the *Town Planning and Development Act 1928*, means the Western Australian Planning Commission; or
 - VIII. a strata plan, strata plan of subdivision or strata plan of consolidation required to be accompanied by a certificate issued under s23 *Strata Titles Act 1985*, means the local government (as defined by the *Town Planning and Development Act 1928*) within the district of which the subdivision is proposed.

Riparian vegetation (see **fringing vegetation**)

Risk—The likelihood that specific effects harmful to man and the environment will occur within a specified period or in specified circumstances (EPA 2000g).

Environmental risk is the risk of damage to the physical or biological environment. The term is used in Chapter D5 in the context of risk of damage to the environment from an unintended incident from nearby development, for example, hazardous industrial plant.

Individual risk of a fatality is the chance (likelihood or probability) per year that any one member of the general public will be killed as a result of exposure to an activity (EPA 2000g).

Societal risk is a measure of the chance of a number of people being killed as a result of an accident.

Salinisation, salinity—Accumulation of salts in soil and water causing problems for the natural environment, agriculture and the built environment.

Scheme*—Means:

- a. a redevelopment scheme within the meaning of the *East Perth Redevelopment Act 1991*, or an amendment to such a redevelopment scheme
- b. a redevelopment scheme within the meaning of the *Midland Redevelopment Act 1999*, or an amendment to such a redevelopment scheme
- c. a master Plan within the meaning of the *Hope Valley-Wattleup Redevelopment Act 2000*, or an amendment to such a master plan
- d. a redevelopment scheme within the meaning of the *Armadaale Redevelopment Act 2001*, or an amendment to such a redevelopment scheme
- e. a redevelopment scheme within the meaning of the *Subiaco Redevelopment Act 1994*, or an amendment to such a redevelopment scheme
- f. an amendment to the Metropolitan Region Scheme
- g. a regional planning scheme, or an amendment to a regional planning scheme
- h. a town planning scheme, or an amendment to a town planning scheme or
- i. a statement of planning policy to which s5AA(8) *Town Planning and Development Act 1928* applies, or an amendment to such a statement.

Sedimentation—The process by which sediment is deposited, for example, in waterways. Sediments include sand, clay, silt, pebbles and organic material carried and deposited by water or wind. Sedimentation is a serious environmental issue that reduces water quality and biodiversity and may increase the likelihood of flooding.

Sensitive land use—A land use sensitive to emissions from industry and infrastructure. Sensitive land uses include residential development, hospitals, hotels, motels, hostels, caravan parks, schools, nursing homes, child care facilities, shopping centres, playgrounds and some public buildings. Some commercial, institutional and industrial land uses which require high levels of amenity or are sensitive to particular emissions may also be considered sensitive land uses. Examples include some retail outlets, offices and training centres, and some types of storage and manufacturing (EPA 2004k).

Serious environmental harm*—Means environmental harm that:

- a. is irreversible, of a high impact or on a wide scale
- b. is significant or in an area of high conservation value or special significance; or
- c. results in actual or potential loss, property damage or damage costs of an amount, or amounts in aggregate, exceeding five times the threshold amount.

Significant ecological community—Includes:

- a. an ecological community listed, designated or declared under a Western Australian law or a law of the Commonwealth as threatened, endangered or vulnerable
- b. an ecological community listed on CALM's threatened ecological communities database
- c. a geographically restricted ecological community.

Significant fauna—Include but are not necessarily limited to species protected by international agreements or treaties (for example, JAMBA and CAMBA migratory bird agreements), Specially Protected Fauna, Priority Fauna, short range endemic species, species with declining populations or declining distributions, species at the extremes of their range, isolated outlying populations and undescribed species (EPA 2004h).

Significant flora—Significant flora includes but is not limited to flora with any of the following characteristics (EPA 2004f):

- a. Declared Rare Flora or Priority Flora
- b. keystone role in a particular habitat for threatened species, or supporting large populations representing a significant proportion of the local regional population of a species
- c. relic status
- d. anomalous features that indicate a potential new discovery
- e. representative of the range of a species including the extremes of the range, recently discovered range extensions, or isolated outliers of the main range
- f. a restricted subspecies, variety or naturally occurring hybrid
- g. local endemism or a restricted distribution.

Significance may apply at any level (for example, local, regional, national and international).

Significant habitat—Habitat that provides resources (breeding, resting and feeding), connectivity or habitat area for a species or community that is important for its survival.

Significant proposal*—A proposal likely, if implemented, to have a significant effect on the environment.

Significant vegetation—Includes but is not limited to native vegetation with any of the following characteristics (EPA 2004f):

- a. a **threatened ecological community**
- b. below a **threshold** level
- c. scarcity
- d. unusual species
- e. novel combination of species
- f. a refuge
- g. key habitat for threatened species or large populations representing a significant proportion of the local to regional total population of a species
- h. representative of the range of a vegetation unit including a good example in prime habitat, or the extremes of the range, recently discovered range extensions, or isolated outliers of the main range
- i. a restricted distribution.

Significance may apply at any level (for example, local, regional, national and international).

Social surroundings*—For the purposes of the definition of 'environment' in the EP Act, the social surroundings of man are his aesthetic, cultural, economic and social surroundings to

the extent that those surroundings directly affect or are affected by his physical or biological surroundings.

Social value—An ideal or belief considered important and accepted by society.

Specially Protected Fauna—Animal species listed under s14(2)(ba) *Wildlife Conservation Act 1950* and published in the latest Wildlife Conservation (Specially Protected Fauna) Notice in the Western Australian Government Gazette.

Stakeholder—Any organisation, government entity, group or individual that has an interest in a particular issue.

Standards—Quantifiable characteristics against which quality can be assessed.

State geoheritage site—A site with geological features recognised by the Geological Society of Australia, through a formal process of consideration by the State Geoheritage Committee, as being of scientific importance.

Statutory planning—The legal form of planning where legislation and planning law prescribe procedures for the preparation, adoption and implementation of controls for land use and development. Statutory planning mechanisms include region schemes, town planning schemes, subdivision applications and development applications.

Stormwater—Stormwater is water flowing over ground surfaces and in natural streams and drains as a direct result of rainfall over a catchment (ARMCANZ & ANZECC 2000).

Strategic planning—A general term for planning processes that set out objectives and/or future intended broad uses for areas of land, and the recommended steps and considerations that assist the coordination of planning and development. Strategic planning mechanisms include planning policies and strategy or structure plans.

Strategic proposal*—A proposal is a strategic proposal if and to the extent it identifies:

- a. a future proposal that will be a significant proposal or
- b. future proposals likely, if implemented in combination with each other, to have a significant effect on the environment.

Stratospheric ozone depletion—Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. It is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons). These break down when they reach the

stratosphere and then catalytically destroy ozone molecules (DEP 2000a).

Stygofauna—Fauna living in groundwater.

Sumpland—Seasonally inundated basin wetland.

Surface water—Water flowing or held in waterways and wetlands on the surface of the landscape.

Sustainable development, sustainability—Meeting the needs of current and future generations through an integration of environmental protection, social advancement and economic prosperity (Government of Western Australia 2003a).

Systems 1–12—These are 12 geographic areas (Systems) that cover Western Australia. The Systems were identified by the Conservation through Reserves Committee set up by the EPA in the 1970s. At the time, the Systems formed the basis for the review of the conservation reserves of Western Australia. The EPA's recommendations for the Systems are set out in the EPA **Red Books**. The location of the Systems is shown in EPA (1993a).

Targets, environmental targets—The numerical value or narrative statement that serves as a long-term or short-term time related benchmark.

Taxa (singular **Taxon**)—A taxonomic group. Depending on context, this maybe a species or their subdivisions (subspecies, varieties etc), genus or higher group.

Terrestrial fauna—Animal species living in or on land. For the purposes of this Guidance Statement, freshwater vertebrates including fish and amphibians and aerial species are included, but marine fauna are not.

Threat—The likely severity of a potential impact on the environmental value(s) of a natural resource asset from either a naturally occurring phenomenon or human activity (EPA 2004b).

Threatened and poorly reserved plant communities—Communities that have been recognised and mapped by the EPA (1994). This series of bushland areas on the Swan Coastal Plain was considered to be in need of interim protection under the System 6 and Part System 1 Update Program. The majority of these areas are on the eastern side of the Swan Coastal Plain, with several from the west of the Plain. Studies by Keighery and Trudgen (1992) and Gibson et al. (1994) were used to identify these areas. Bush Forever Sites update and supersede the threatened and poorly reserved plant community sites within the Bush Forever study area (EPA 2003a).

Threatened ecological community

- a. An ecological community listed, designated or declared under a Western Australian law or a law of the Commonwealth as threatened, endangered or vulnerable or
- b. an ecological community listed on CALM's threatened ecological communities database.

For the purposes of the EP Act, the term comprises (a) only.

Threatened species—In this guidance statement, the term threatened species is used in a broad sense to describe all or any species whose conservation status is considered insecure. It includes species in the 'extinct', 'critically endangered', 'endangered', 'vulnerable', 'rare' and 'data deficient' categories. For a discussion on the categories of threatened species and criteria for identifying categories, see the World Conservation Union's Red List website www.redlist.org.

Threshold—The allowable level of change to the environment caused by human activities before some form of management action is triggered (EPA 2004b).

Total water management (see water cycle management)

Town planning scheme—As defined in the Town Planning and Development Act 1928.

Troglobitic fauna—Fauna living permanently underground and generally beyond the daylight zone of a cave.

Underground water pollution control area—An area constituted under s57A *Metropolitan Water Supply, Sewerage and Drainage Act 1909* for the protection of drinking water quality.

Value (see **environmental value**)

Vegetation—The combinations of plant species within a given area, and the nature and extent of each combination (adapted from EPA 2004f).

Vegetation complex—A vegetation classification term used in Heddle et al. (1980) and Matiske and Havel (1998). The vegetation complexes are based on the pattern of vegetation at a regional scale as it reflects the underlying key determining factors of landforms, soils and climate (EPA 2003a).

Vegetation association, vegetation type—Vegetation classification terms used in Beard (1974-1981, 1990) and in Shepherd et al. (2002).

Vegetation unit—A general purpose term that applies to vegetation categories regardless of scale (EPA 2004f). A vegetation unit typically is an area of vegetation with unifying characteristics based on consideration of some or all of the following: species composition, structure of the vegetation, growth form, plant associations and plant formation.

Vibration—In Western Australia, all vibration is included in the definition of **noise** under s3 EP Act.

Visual amenity—Visual landscape character that is valued by the community. Protection of the visual amenity of the surrounding environment is important to the sense of well-being and quality of life of the community.

Water cycle management, integrated water cycle management, total water management—The holistic management of water including water supply, stormwater and wastewater, in accordance with the principles of sustainability (as defined in Government of Western Australia 2003a) to maintain the integrity of the water cycle. The water cycle is the recirculation of water through precipitation, flows on and in the land, interception and storage, treatment and supply, water use, management of stormwater and wastewater, discharge to rivers and oceans, evaporation and transpiration, and cloud formation.

Water regime—The prevailing pattern of water flow and behaviour over a given time, including minimum and maximum water depths, timing of filling and drying. It may also include a description of water quality.

Water resources—Water in the landscape (above and below ground), with current or potential value to ecosystems and the community.

Water sensitive urban design (WSUD)—A design philosophy that provides a framework for managing water-related issues in urban areas. WSUD incorporates the sustainable management and integration of stormwater, wastewater and water supply into urban design. WSUD principles include incorporating water resource management issues early in the land use planning process. WSUD can be applied at the lot, street, neighbourhood, catchment and regional scale.

Watercourse—A river, stream, creek or man-made drainage features in which water flows in a channel, whether permanently or intermittently.

Waterway—Waterways for the purposes of this guidance statement consist of:

- a. river and stream systems including permanent, seasonal and ephemeral drainage lines
- b. wetlands connected to the stream systems (that is, those wetlands fed mainly by rivers and streams)
- c. lakes, estuaries or inlets at the base of these systems
- d. and, depending on the context, may include the floodplains of the above.

Wetland*—An area of seasonally, intermittently or permanently waterlogged or inundated land, whether natural or otherwise, and includes a lake, swamp, marsh, spring, dampland, tidal flat or estuary.

Wetland attribute—A characteristic or combination of characteristics which is valued by a group within society, but which does not necessarily support a use (Hill et al. 1996a).

Wetland buffer (see buffer)

Wetland characteristic—Those properties of a wetland which describe the area in simple and objective terms e.g. size, species present, soils and water quality. Functions, uses or attributes of a wetland are the products of its characteristics singly or in combination.

Wetland function—Wetlands functions are the physical and biological processes occurring within a wetland.

Wetland management category—The management category assigned to a wetland based on the evaluation of its attributes, functions and values. It provides guidance on the nature of management and protection the wetland should be afforded. The categories that have been used on the Swan Coastal Plain in Western Australia are **conservation, resource enhancement and multiple use**.

Wetland value—A wetland value is a beneficial use or an ecosystem health condition. That is, a condition of the ecosystem relevant to the maintenance or ecological structure, ecological function or ecological process.

Wetland vegetation, wetland dependent vegetation—Vegetation that is adapted to inundated or waterlogged conditions that often forms overlapping zones along an elevational gradient from the deepest part of a wetland.

Wilderness—Areas of minimal disturbance in Australia have been mapped as part of the Commonwealth Wilderness Delineation Project using four criteria: remoteness from settlement; remoteness from access; biophysical naturalness; and apparent naturalness. Information on the Australian Land Disturbance Database (formerly the National Wilderness Inventory) is available on www.heritage.gov.au.

Appendix 2

The role of the Environmental Protection Authority

What is the Environmental Protection Authority?

The Environmental Protection Authority (EPA) is a statutory authority and is the primary provider of independent environmental advice to government. The EPA is not a regulatory body. The EPA consists of five members, including a full-time chairman.

When was the EPA established?

The EPA came into existence on 1 January 1972 and operates under the *Environmental Protection Act 1986* (EP Act).

What is the 'environment' to the EPA?

The EP Act defines environment to mean 'living things, their physical, biological and social surroundings, and interactions between all of these'. For the purposes of the definition of environment 'the social surroundings of man are his aesthetic, cultural, economic and social surroundings to the extent that those surroundings directly affect or are affected by his physical or biological surroundings'.

What are the EPA's objectives?

The EPA's objectives are to protect the environment and to prevent, control and abate pollution.

How does the EPA achieve its objectives?

The EPA achieves these objectives through:

- providing advice to the community, stakeholders, developers, regulators and those within Government who formulate environmental policy
- preparing Environmental Protection Policies (EPPs) which have the force of law and State Environmental Policies (SEP), position statements and guidance statements which are non-statutory. Details of the policy program are provided on the EPA website (www.epa.wa.gov.au)
- assessing development proposals, schemes, scheme amendments and activities that have the potential to impact on the environment, and advising the Minister for the Environment regarding their environmental acceptability. Details are on the EPA website.

- auditing compliance with ministerial conditions for proposals for which the Department of Environment and Conservation is the proponent.

Who does the EPA involve when formulating advice to the minister?

The EPA receives information from many sources, including the public, developers, peak bodies, interest groups and government departments, particularly the Department of Environment and Conservation.

In addition, the EPA has established four reference panels for mining, industrial, natural resource management and land use planning. Each reference panel has technical experts and community representation. The EPA may refer matters relevant to a particular reference panel for advice.

How does the EPA give advice to government?

The EPA makes recommendations to the Minister for the Environment. The advice is public, and is generally through bulletins. The government, through the minister, makes the final decisions.

How can the EPA's advice be implemented?

The three main instruments for implementing the EPA's advice to government are:

- government endorsed statutory EPPs or non-statutory SEPs, which have been developed by the EPA in consultation with all interested parties
- ministerial conditions set by the Minister for the Environment on development proposals assessed by the EPA
- bodies, including government, government agencies, local government, stakeholders and the community implementing the EPA's policies and advice, as provided or modified.

Other functions of the EPA

The minister can request the EPA to carry out other functions. For instance, the minister has asked the EPA to carry out State of the Environment reporting and Natural Resource Management environmental performance auditing.

The EPA publishes position statements to provide the overarching principles and information which the EPA would use when giving advice to the minister, the public, proponents, and decision-makers. Examples of positions statements are: *Environmental Protection of Cape Range Province, Environmental Protection of Native Vegetation in Western Australia and Terrestrial Biological Surveys as an Element of Biodiversity Protection.*

In addition, the EPA publishes guidance statements that provide direction to proponents in developing their proposals for environmental impact assessment.

Examples of guidance statements are: *Protection of Tropical Arid Zone Mangroves Along the Pilbara Coastline, Deep Well Injection of Liquid Industrial Waste and Minimising Greenhouse Gas Emissions.*

All position and guidance statements are available on the EPA's website.

Appendix 3

Prescribed premises

Certain industries with a significant potential to pollute the environment are known as **prescribed premises** under the *Environmental Protection Act 1986* (EP Act) and must hold a works approval (for construction) and a licence or registration (for operation). These industries are listed below.

Licences and works approvals are issued with legally binding conditions and are intended to prevent or minimise pollution. Registrations are issued to premises that are managed through industry regulations and codes of practice. Department of Environment and Conservation (DEC) regional offices administer the licensing system and works approvals.

For further information, the reader is referred to:

- *A Guide to the Licensing System* (DoE 2004h)
- *Guide to Works Approvals* (DoE 2004i).

Referral of proposals involving prescribed premises to the EPA

The DEC regional office dealing with a new prescribed activity or a major change to an existing operation will consider whether the proposal needs to be referred to the EPA, and refer it to the EPA if appropriate. Local and state Government authorities generally need not refer applications they receive involving prescribed premises to the EPA.

SCHEDULE 1 – PRESCRIBED PREMISES

PART 1 (Works Approval and Licence)

Category number	Description of Category	Production or design capacity
1	Cattle feedlot: premises on which animals or the watering and feeding of cattle occurs, being premises - a. situated less than 100 metres from a watercourse; and b. on which the number of cattle per hectare exceeds 50.	500 animals or more
2	Intensive piggery: premises on which pigs are fed, watered and housed in pens.	1 000 animals or more
3	Aquaculture (ponds or tanks): premises on which - a. marine, estuarine or freshwater fish or prawns are propagated or reared; and b. supplementary feeding occurs, c. in ponds or tanks that discharge waste into waters or onto land.	Biomass 1 000 kilograms or more
4	Aquaculture (natural waters): premises on which - a. marine, estuarine or freshwater fish or prawns are propagated or reared; and b. supplementary feeding occurs, in enclosures in naturally occurring waters.	Not applicable
5	Processing or beneficiation of metallic or non-metallic ore: premises on which - a. metallic or non-metallic ore is crushed, ground, milled or otherwise processed b. tailings from metallic or non-metallic ore are reprocessed; or c. tailings or residue from metallic or non-metallic ore are discharged into a containment cell or dam.	50 000 tonnes or more per year
6	Mine dewatering: premises on which water is extracted and discharged into the environment to allow mining of ore.	50 000 tonnes or more per year
7	Vat or in situ leaching of metal: premises on which metal is extracted from ore with a chemical solution.	5 000 tonnes or more per year
8	Mineral sands mining or processing: premises on which mineral sands ore is mined, screened, separated or otherwise processed.	5 000 tonnes or more per year
9	Coal mining: premises on which - a. water is extracted and discharged into the environment to allow coal mining; or b. coal mining or processing occurs and tailings are discharged.	5 000 tonnes or more per year
10	Oil or gas production from wells: premises, whether on land or offshore, on which crude oil, natural gas or condensate is extracted from below the surface of the land or the seabed, as the case requires, and is treated or separated to produce stabilised crude oil, purified natural gas or liquefied hydrocarbon gases.	5 000 tonnes or more per year
11	Oil or gas production (other): premises (other than premises within category 10) on which the commercial production of oil or gas occurs (including the reforming of hydrocarbon gas).	5 000 tonnes or more per year
12	Screening, etc. of material: premises (other than premises within category 5 or 8) on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated.	50 000 tonnes or more per year
13	Crushing of building material: premises on which waste building or demolition material (for example, bricks, stones or concrete) is crushed or cleaned.	1 000 tonnes or more per year
14	Solar salt manufacturing: premises on which salt is produced by solar evaporation.	Not applicable
15	Abattoir: premises on which animals are slaughtered.	1 000 tonnes or more per year
16	Rendering operations: premises on which substances from animal material are processed or extracted.	100 tonnes or more per year

Category number	Description of Category	Production or design capacity
17	Milk processing: premises on which - a. milk is separated or evaporated (other than a farm); or b. evaporated or condensed milk, butter, ice cream, cheese or any other dairy product is manufactured, c. and from which liquid waste is or is to be discharged onto land or into waters.	100 tonnes or more per year
18	a. Food processing: premises (other than premises within category 24) - b. on which vegetables are, or fruit or meat is, preserved cooked, dried, canned, bottle or processed; and c. from which liquid waste is or is to be discharged onto land or into waters.	200 tonnes or more per year
19	Edible oil or fat processing: premises on which vegetable oil or oil seed or animal fat is processed and from which liquid waste is or is to be discharged onto land or into waters.	200 tonnes or more per year
20	Starch manufacturing: premises on which starch or gluten is manufactured and from which liquid waste is or is to be discharged onto land or into waters.	200 tonnes or more per year
21	Sugar milling or refining: premises on which sugar cane is crushed or sugar is refined.	1 000 tonnes or more per year
22	Seafood processing: premises (other than a fish wholesaler) on which fish or other seafood is processed and from which liquid waste is or is to be discharged onto land or into waters.	200 tonnes or more per year
23	Animal feed manufacturing: premises (other than premises within category 15 or 16) on which animal food is manufactured or processed.	1 000 tonnes or more per year
24	Non-alcoholic beverage manufacturing: premises on which a non-alcoholic beverage is manufactured and from which liquid waste is or is to be discharged onto land or into waters.	200 kilolitres or more per year
25	Alcoholic beverage manufacturing: premises on which an alcoholic beverage is manufactured and from which liquid waste is or is to be discharged onto land or into waters.	350 kilolitres or more per year
26	Textile operations: premises on which - a. carpet is manufactured b. cotton ginning or milling occurs; or c. textiles are bleached, dyed or finished.	1 000 tonnes or more per year
27	Wool scouring: premises on which wool is scoured or cleaned.	1 000 tonnes or more per year
28	Wood board manufacturing: premises on which particleboard or chipboard is fabricated or manufactured.	500 tonnes or more per year
29	Timber preserving: premises on which timber is preserved for commercial purposes by the use of chemicals.	Not applicable
30	Pulp, paper or paperboard manufacturing: premises on which paper pulp, wood pulp, kraft paper, kraft paperboard, cardboard, paper or paperboard is manufactured.	5 000 tonnes or more per year
31	Chemical manufacturing: premises (other than premises within category 32) on which chemical products are manufactured by a chemical process.	100 tonnes or more per year
32	Pesticides manufacturing: premises on which herbicides, insecticides or pesticides are manufactured by a chemical process.	Not applicable
33	Chemical blending or mixing: premises on which chemicals or chemical products are mixed, blended or packaged in a manner that causes or is likely to cause a discharge of waste into the environment.	500 tonnes or more per year
34	Oil or gas refining: premises on which crude oil, condensate or gas is refined or processed.	Not applicable
35	Asphalt manufacturing: premises on which hot or cold mix asphalt is produced using crushed or ground rock aggregates mixed with bituminous or asphaltic materials for use at places or premises other than those premises.	Not applicable
36	Bitumen manufacturing: premises on which bitumen is mixed or prepared for use at places or premises other than those premises.	Not applicable

Category number	Description of Category	Production or design capacity
37	Char manufacturing: premises on which wood, carbon material or coal is charred to produce a fuel or material of a carbonaceous nature or of enriched carbon content.	10 tonnes or more per year
38	Coke production: premises on which coke is produced, quenched, cut, crushed or graded from coal or petroleum.	100 tonnes or more per year
39	Chemical or oil recycling: premises on which waste liquid hydrocarbons or chemicals are refined, purified, reformed, separated or processed.	Not applicable
40	Glass or glass fibre manufacturing: premises on which glass or glass fibre is manufactured.	200 tonnes or more per year
41	Clay bricks or ceramic products manufacturing: premises on which refractory products, tiles, pipes or pottery are manufactured.	1 000 tonnes or more per year
42	Mineral wool or ceramic fibre manufacturing: premises on which mineral wool or ceramic fibre is manufactured.	Not applicable
43	Cement or lime manufacturing: premises on which - a. clay, limesand or limestone material is used in a furnace or kiln in the production of cement clinker or lime; or b. cement clinker, clay limestone or similar material is ground.	Not applicable
44	Metal smelting or refining: premises on which metal ore, metal ore concentrate or metal waste is smelted, fused, roasted, refined or processed.	1 000 tonnes or more per year
45	Metal melting or casting: premises on which metal or scrap metal is melted in furnaces or cast.	100 tonnes or more per year
46	Bauxite refining: premises (other than premises within paragraph (b) of category 6) on which alumina is produced from bauxite refining.	Not applicable
47	Scrap metal recovery: premises (other than premises within category 45) on which metal scrap is fragmented or melted, including premises on which lead acid batteries are reprocessed.	100 tonnes or more per year
48	Metal finishing: premises on which metals are chemically cleaned or metals, plastics or metal or plastic products are plated, electroplated, anodised, coloured or otherwise coated or finished.	Not applicable
48A	Metal finishing: premises on which iron or steel is galvanized.	Not applicable
49	Boat building and maintenance: premises on which - a. vessels are commercially built or maintained; and b. organotin compounds are used or removed from vessels.	Not applicable
50	Tannery: premises on which animal skins or hides are tanned, dressed, finished or dyed and from which liquid waste is or is to be discharged onto land or into waters.	1 000 skins or hides or more per year
51	Foam products manufacturing: premises on which resin is used to prepare or manufacture plastic foam or plastic foam products using MDI (diphenylmethane di-iso-cyanate) or TDI (toluene-2, 4-di-iso-cyanate).	1 tonne or more per year
52	Electric power generation: premises (other than premises within category 53 or an emergency or standby power generating plant) on which electrical power is generated using a fuel.	20 megawatts or more in aggregate (using natural gas) 10 megawatts or more in aggregate (using a fuel other than natural gas)
53	Flyash disposal: premises on which flyash is disposed of.	1000 tonnes or more per year
54	Sewage treatment facility: premises - a. on which sewage is treated (excluding septic tanks); and b. from which treated sewage is discharged onto land or into waters.	100 cubic metres or more per day

Category number	Description of Category	Production or design capacity
55	Livestock saleyard or holding pen: premises on which live animals are held pending their sale, shipment or slaughter.	10 000 animals or more per year
56	Used tyre storage (tyre fitting business): premises on which used tyres are stored in connection with a tyre fitting business.	500 tyres or more
57	Used tyre storage (general): premises (other than premises within category 56) on which used tyres are stored.	100 tyres or more
58	Bulk material loading or unloading: premises on which clinker, coal, ore, ore concentrate or any other bulk granular material is loaded onto or unloaded from vessels by an open materials loading system.	100 tonnes or more per day
59	Biomedical waste incineration: premises on which - a. infectious or potentially infectious waste produced by health care establishments, or by pathology, dental, or veterinary practices, or by laboratories, is incinerated b. quarantine waste is incinerated; or c. cytotoxic waste is destroyed, d. but not including premises on which there are only facilities used exclusively for human or animal cremation.	Not applicable
60	Incineration: premises (other than premises within category 59) on which waste, excluding clean paper and cardboard, is incinerated.	100 kilograms or more per hour
61	Liquid waste facility: premises on which liquid waste produced on other premises (other than sewerage waste) is stored, reprocessed, treated or irrigated.	100 tonnes or more per year
61A	Solid waste facility: premises (other than premises within category 67A) on which solid waste produced on other premises is stored, reprocessed, treated, or discharged onto land.	1000 tonnes or more per year
62	Solid waste depot: premises on which waste is stored, or sorted, pending final disposal or re-use.	500 tonnes or more per year
63	Class I inert landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled 'Landfill Waste Classification and Waste Definition 1996', published by the Chief Executive Officer and as amended from time to time) is accepted for burial.	500 tonnes or more per year
64	Class II or III putrescible landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled 'Landfill Waste Classification and Waste Definition 1996', published by the Chief Executive Officer and as amended from time to time) is accepted for burial.	20 tonnes or more per year
65	Class IV secure landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled 'Landfill Waste Classification and Waste Definition 1996', published by the Chief Executive Officer and as amended from time to time) is accepted for burial.	Not applicable
66	Class V intractable landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled 'Landfill Waste Classification and Waste Definition 1996', published by the Chief Executive Officer and as amended from time to time) is accepted for burial.	Not applicable
67	Fuel burning: premises on which gaseous, liquid or solid fuel is burnt in a boiler for the supply of steam or in power generation equipment.	In aggregate 500 kilograms or more per hour (fuel with a sulphur content of 0.25% or more), or In aggregate 2 000 kilograms or more per hour (fuel with a sulphur content of less than 0.25%)
67A	Compost manufacturing and soil blending: premises on which organic material (excluding silage) or waste is stored pending processing, mixing, drying or composting to produce commercial quantities of compost or blended soils.	1 000 tonnes or more per year

PART 2 (Works Approval and Licence or Registration)

Category number	Description of Category	Production or design capacity
68	Cattle feedlot: premises on which the watering and feeding of cattle occurs, being premises - a. situated 100 metres or more from a watercourse; and b. on which the number of cattle per hectare exceeds 50.	500 animals or more
69	Intensive piggery: premises on which pigs are fed, watered and housed in pens.	More than 500 but less than 1 000 animals
70	Screening, etc. of material: premises on which material extracted from the ground is screened, washed, crushed, ground, milled, sized or separated.	More than 5 000 but less than 50 000 tonnes per year
(71)	(Deleted)	
72	Chemical manufacturing: premises on which chemical products are manufactured by a chemical process.	Not more than 100 tonnes per year
73	Bulk storage of chemicals, etc: premises on which acids, alkalis or chemicals that - a. contain at least one carbon to carbon bond; and b. are liquid at STP (standard temperature and pressure), c. are stored.	1 000 cubic metres in aggregate
74	Chemical blending or mixing causing discharge: premises on which chemicals or chemical products are mixed, blended or packaged in a manner that causes or is likely to cause a discharge of waste into the environment.	More than 50 but less than 500 tonnes per year
75	Chemical blending or mixing not causing discharge: premises on which chemicals or chemical products are mixed, blended or packaged in a manner that does not cause or is not likely to cause a discharge of waste into the environment.	5 000 tonnes or more per year
76	Ceramic goods manufacturing: premises on which ceramic kitchen or table ware or other non-refractory ceramic products are manufactured.	200 tonnes or more per year
77	Concrete batching or cement products manufacturing: premises on which cement products or concrete are manufactured for use at places or premises other than those premises.	100 tonnes or more per year
78	Plaster manufacturing: premises on which plaster, plaster board, gyprock or other products comprised wholly or primarily of gypsum are manufactured.	500 tonnes or more per year
79	Carbon stripping: premises on which carbon granules from a gold extraction process located at another place or on other premises are reprocessed.	100 tonnes or more per year
80	Non-metallic mineral processing: premises on which non-metallic minerals are crushed, ground, milled or separated.	100 tonnes or more per year
81	Metal coating: premises on which metal products (excluding vehicles) are spray painted, powder coated or (paint or powder) enamelled.	1000 litres or more per year
82	Boat building and maintenance: premises on which - a. vessels are commercially built or maintained; and b. organotin compounds are not used or removed from vessels.	Not applicable
83	Fellmongering: premises on which animal skins or hides are dried, cured or stored.	1000 skins or hides or more per year
84	Electric power generation: premises (other than premises within category 53 or an emergency or standby power generating plant) on which electrical power is commercially generated using natural gas as a fuel.	More than 10 but less than 20 megawatts in aggregate
85	Sewage facility: premises - a. on which sewage is treated (excluding septic tanks); or b. from which treated sewage is discharged onto land or into waters.	More than 20 but less than 100 cubic metres per day
85A	Sewage pumping station: premises on which sewage is pumped (other than to or from septic tanks) and where a discharge of waste from the station may enter the Swan River or the Canning River.	Not Applicable

Category number	Description of Category	Production or design capacity
86	Bulk material loading or unloading: premises on which clinker, coal, ore, ore concentrate or any other bulk granular material is loaded onto or unloaded from vessels by a closed materials loading system.	100 tonnes or more per day
87	Fuel burning: premises on which gaseous, liquid or solid fuel with a sulphur content of less than 0.25% is burnt in a boiler for the supply of steam or in power generation equipment.	More than 500 but less than 2 000 kilograms per hour in aggregate
88	Metal finishing: premises on which <ul style="list-style-type: none"> a. metals are chemically cleaned or metals, plastics or metal or plastic products are plated, electroplated, anodised, coloured or otherwise coated or finished; and b. from which liquid waste is discharged into a sewer. 	Not applicable
89	Putrescible landfill site: premises on which waste (as determined by reference to the waste type set out in the document entitled 'Landfill Waste Classification and Waste Definition 1996', published by the Chief Executive Officer and as amended from time to time) is accepted for burial.	More than 20 but less than 5 000 tonnes per year

SCHEDULE 2 – PREMISES SUBJECT TO REGISTRATION

(Registration only required for these premises)

Category Number	Description of Category	Production or design capacity
1	Abattoir: premises on which animals are slaughtered.	More than 100 but less than 1000 tonnes per year
2	Smoking, drying or curing operations: premises (other than a retail butcher shop or chicken outlet) on which meat or other edible products are smoked, dried or cured.	More than 200 tonnes per year
3	Fibreglass reinforced plastic manufacturing: premises on which resin is used to prepare or manufacture reinforced plastics or reinforced plastic products.	More than 1 tonne per year
4	Water treatment facility: premises on which water is treated for domestic use.	More than 1 megalitre per day
5	Abrasive blasting operations: premises on which metal or other material is cleaned or abraded by blasting with any abrasive blasting material or abrasive blasting equipment.	Not applicable

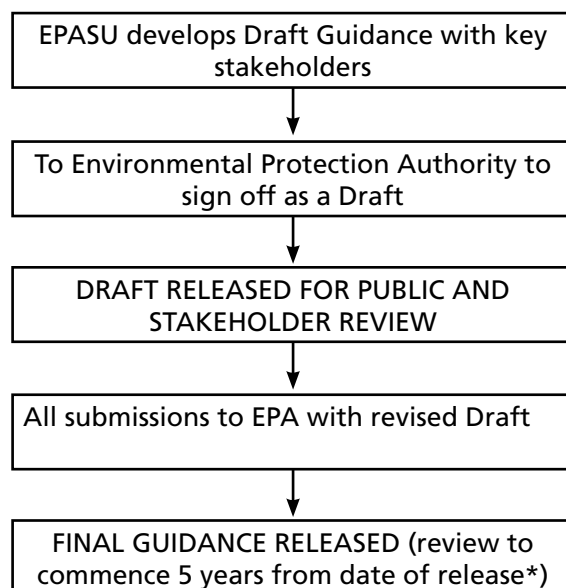
Appendix 4

Status of this Guidance Statement

Index	Final guidance	May 2008
Status	Signed-off by the EPA	
Citation	This document can be cited as Guidance Statement No.33 - Environmental Guidance for Planning and Development.	

Appendix 5

Generic flow diagram for the Guidance Statement process



* Guidance may be reviewed earlier if circumstances require it.