Fremantle — Rockingham Industrial Area Regional Strategy

Western Australian Planning Commission

A submission by the Environmental Protection Authority to the Western Australian Planning Commission prepared under Section 16(j) of the Environmental Protection Act

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Summary and recommendations

The Fremantle-Rockingham Industrial Area Regional Strategy (FRIARS) has been prepared by the Western Australian Planning Commission (WAPC) to ensure that the Fremantle-Rockingham region can be developed in the most appropriate manner (WAPC, 1999). FRIARS focuses on the Kwinana Industrial Area (KIA) and outlines four land use options and one sub-option for the future development of this area.

This report is the Environmental Protection Authority's (EPA) advice to the Western Australian Planning Commission (WAPC) under Section 16(j) of the Environmental Protection Act in relation to the environmental issues raised by FRIARS.

The intent of the EPA's advice is to:

- assess each of the options in FRIARS in terms of the EPA's environmental objectives and criteria.
- ensure FRIARS adequately recognises and considers appropriate environmental issues;
- identify the environmental matters which requires FRIARS to be modified prior to finalisation; and
- identify the environmental matters which will require further consideration during subsequent statutory planning processes (ie. Metropolitan Region Scheme and town planning scheme amendments, subdivision and development proposals) so that the environment will be adequately protected.

The EPA will also use the advice provided in this report when assessing subsequent statutory planning instruments (ie. Metropolitan Region Scheme amendments) and development proposals.

This report does not constitute a formal assessment under Part IV of the Environmental Protection Act and assessments under Section 16 of the Act do not lead to the setting of legally binding environmental conditions.

Summary of EPA recommendations

FRIARS reviewed the following land use options for the Kwinana EPP buffer in the KIA:

Option 1: No Change

Retention of current land uses.

Option 2: Mixed-Use Development

Mixed use development with additional general industry and retention of Hope Valley, Wattleup and rural areas.

Option 3a: General Industrial Use

General industrial land uses in Hope Valley and retention of Wattleup and some rural areas.

Option 3b: General/Heavy Industrial Use

Some as 3a but with some additional heavy industry. Wattleup is retained.

Option 4: Integrated Industrial Expansion - No townsites

Integrated general and heavy industrial expansion. The majority of residences within the Kwinana EPP air quality buffer are proposed to be removed except for the rural residential lots to the west of Thompsons Lake.

The EPA's recommendations in relation to the land use options considered in FRIARS are summarised as follows:

Heavy and general industry

In relation to buffer requirements for air quality, odour, noise and risk the EPA advises that:

- Option 4 would provide an adequate buffer between the existing/proposed heavy industrial area and surrounding sensitive land uses so that the EPA's environmental objectives and criteria in relation to air quality, odour, noise, and risk can be met, provided that additional planning controls are implemented to manage the remaining rural/residential areas within the buffer;

- Option 4 would improve the compatibility between land uses within the Kwinana EPP air quality buffer and allow the DEP to manage air quality, odour, noise and risk in a manner that and place fewer constraints on industrial activity;

- Options 1, 2, 3a and 3b may not provide an adequate buffer around the existing KIA when it is developed to its full potential, to meet the EPA's objectives and criteria for air quality, odour, noise and risk unless special land use controls are involved;

- sulfur dioxide licences currently take up the full capacity of the Kwinana airshed. For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for existing industries emitting sulfur dioxide if there is to be further industrial development within the KIA in the long term.

- the Kwinana EPP air quality buffer is required to provide a basis for management so that the EPA's environmental objectives can be met for noise and risk as well as air quality. The EPA would prefer that the buffer is called the Kwinana Industrial Buffer and is zoned appropriately so that it can be used as the basis for environmental management for all relevant environmental issues;

- the EPA supports the principle of implementing land use controls in the buffer area to prevent land use conflicts and ensure land use compatibility between heavy industry and sensitive land uses as promoted in FRIARS; and

- there will be a need to introduce land use controls for the rural residential lots still remaining within the buffer for all options.

In relation to protecting groundwater quality and subsequent impacts on marine water quality the EPA advises that:

- the proposed expansion of heavy industry and general industry as depicted in Options 2, 3a, 3b and 4 will need to be carefully managed in order to avoid cumulative impacts on groundwater quality;
- groundwater quality will need to be managed through EPA licences for each industry in Option 1, 2, 3a, 3b and 4; and
- on going contamination of groundwater from horticultural activities will occur but from a smaller land area in Options 2, 3a, 3b and 4.

In relation to protecting regionally significant wetlands and vegetation the EPA advises that:

- an appropriate buffer and land use management will be required between Mt Brown Lake and Long Swamp and the industrial areas identified in Option 2, 3a, 3b and 4 to prevent unacceptable impacts on either the water quality or the hydrology of the wetlands due to the change in land use; and
- Option 1 is likely to increase likely impacts on the regionally significant wetlands.

The EPA advises that the following environmental issues concerning heavy and general industry be deferred for assessment during subsequent statutory planning stages:

- new general industry proposals will need to be managed pursuant to Part V of the Environmental Protection Act and during subsequent statutory planning processes to meet the agreed environmental criteria for air quality, odour, noise, risk, regionally significant vegetation, regionally significant wetlands and groundwater quality;

- new project proposals for heavy industry may need to be assessed under Part IV of the Environmental Protection Act and issued with a works approval and licence under Part V of the Act to determine compliance with the National Environmental Protection Measure for Ambient Air Quality (NEPM) as reflected in the Kwinana Air Quality EPP;

- new heavy industrial proposals in the KIA (including the new heavy industrial area identified in Options 3b and 4) involving a significant element of risk will need to provide a risk assessment to the EPA at an early stage of the environmental assessment process. Cumulative risk contours should also be updated ensuring that cumulative risk criteria would not be exceeded;

- new heavy industry proposals will need to be managed pursuant to the Environmental Protection Act to meet the agreed environmental criteria for groundwater quality in the context of the marine water quality criteria being set as part of the *Southern Metropolitan Coastal Waters Study*;

- noise levels at the boundary of the Kwinana EPP buffer should comply with the Environmental Protection (Noise) Regulations 1997. Provisions should be incorporated in town planning schemes requiring that allowable noise levels be applied to the proposed heavy industrial areas in Options 3b and 4 to ensure that acceptable noise levels can be achieved within the buffer area pursuant to the Noise Regulations. The allowable noise levels should be modelled using the criteria outlined in the EPA's *Draft Guidance Statement for Environmental Noise* (EPA, 1998);

- criteria for groundwater quality, drainage and water balance should be adopted as part of the assessment of Metropolitan Region Scheme amendments to assist in the management and monitoring of future heavy and general industrial development; and

- subsequent planning instruments should adequately protect and also prevent incompatible land uses from locating near the EPP lakes, Conservation category wetlands and Perth Bushplan sites through the provision of compatible land uses and adequate buffers for incompatible land uses;

Transport

To allow the EPA to assess the proposed alignment of Rowley Road, Fremantle-Rockingham Controlled Access Highway and any other proposed regional transport routes in the Fremantle-Rockingham region further information will be required in relation to the following environmental factors:

Noise

Further information will be required on the likely impacts of noise on land uses surrounding the proposed transport routes.

Transport infrastructure and routes are not covered by the Environmental Protection (Noise) Regulations 1997. However, guidelines are being developed by the EPA to help determine acceptable levels of transport noise. Further residential areas and other sensitive land uses should be adequately setback from the railway line.

Risk

Further information will be required on the likely risks to the environment and surrounding land uses associated with the transport of chemicals and hazardous goods. Specific information will be required concerning drainage management in the event of accidental spillage.

Groundwater quality

There is a possible risk arising from major transport in the vicinity of the Jandakot Mound causing contamination of groundwater (Appendix 1 - Figure 8).

Regionally significant vegetation

Additional information is required for the EPA to determine the likely environmental impacts on regionally significant vegetation.

Regionally significant wetlands

Additional information is required for the EPA to determine the likely environmental impacts on regionally significant wetlands (EPP Lakes and Conservation category wetlands).

The EPA advises that:

- the alignment of the proposed transport routes should not be finalised until the EPA has completed an environmental assessment pursuant to Part IV of the Environmental Protection Act;
- there should no additional major transport routes across the Jandakot Mound and associated Environmental Management Areas; and
- the risks associated with the transport of hazardous goods to the KIA should be considered during subsequent statutory planning processes.

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1. Introduction

The Fremantle-Rockingham Industrial Area Regional Strategy (FRIARS) has been prepared by the Western Australian Planning Commission (WAPC) to ensure that the Fremantle-Rockingham region can be developed in the most appropriate manner (WAPC, 1999).

FRIARS covers the area between Fremantle and Rockingham, and extends east to the Kwinana Freeway, although the primary focus is on the land within the *Environmental Protection (Kwinana)(Atmospheric Wastes) Policy* (EPP) air quality buffer.

Four land use options and one sub-option for the future development of the Kwinana Industrial Area (KIA) are examined in FRIARS (Appendix 1 - Figures 1, 2, 3, 4 and 5). Common to all options is the proposed road alignments for Rowley Road and the Fremantle Rockingham Highway. FRIARS selects Option 4 as the preferred land use strategy (Appendix 1 - Figure 5).

FRIARS is the result of a lengthy study and consultation process, overseen by a Steering Committee chaired by the Ministry for Planning (MfP) with representatives from local government, industry and State Government agencies (including the Department of Environmental Protection (DEP)). The WAPC is now seeking advice and comment from the public and government agencies. FRIARS will be finalised after submissions from the community and other stakeholders (including the EPA) are considered, and then any necessary Metropolitan Region Scheme and local town planning scheme amendments will be initiated.

The primary purpose of the EPA's report is to provide advice to the WAPC under Section 16(j) of the Environmental Protection Act. The intent of the EPA's advice is to:

- assess how each of the options in FRIARS performs in terms of the EPA's environmental objectives and criteria.
- ensure FRIARS adequately recognises and considers appropriate environmental issues;
- identify the environmental matters which requires FRIARS to be modified prior to finalisation; and
- identify the environmental matters which will require further consideration during subsequent statutory planning processes (ie. Metropolitan Region Scheme and town planning scheme amendments, subdivision and development proposals) so that the environment will be adequately protected.

The EPA will also use the advice provided in this report when assessing subsequent statutory planning instruments (ie. Metropolitan Region Scheme amendments) and development proposals.

There are a number of schemes and proposals which the EPA is currently assessing pursuant to Part IV of the Environmental Protection Act or providing advice pursuant to Section 16 of the Act. These assessments are as follows:

- Metropolitan Region Scheme Amendment No 1010/33 - Port Catherine

  (The EPA is currently formally assessing this scheme pursuant to Division 3 of Part IV of the EP Act);
- Fremantle-Rockingham Controlled Access Highway south of Fremantle Bypass

  (The EPA is currently preparing advice pursuant to Section 16 of the EP Act);
- Motor sports facility, Kwinana

  (The EPA is currently formally assessing this proposal pursuant to Division 1 of Part IV of the EP Act);
- Kwinana export facility, Kwinana;

  (The EPA is currently formally assessing this proposal pursuant to Division 1 of Part IV of the EP Act); and

- LP Gas Seaboard Terminal, Kwinana
  (The EPA is currently formally assessing this proposal pursuant to Division 1 of Part IV of the EP Act).

Reference should be made to these assessments or advice when finalising FRIARS.

Background information about FRIARS and a summary of the land use options is provided in Section 2 of this Report. Section 3 discusses the status and purpose of the report. Section 4 discusses the environmental issues and factors relevant to the various land use options and recommendations contained in FRIARS. The EPA's conclusions and advice on the land use options and issues raised in FRIARS are outlined in Section 5.

There are six figures in Appendix 1. A list of references is contained in Appendix 2.

1.1 Limitations of the EPA's advice

The FRIARS study area is focused on land uses within the Kwinana EPP buffer and does not include Cockburn Sound. The EPA has resolved to limit its advice in this report to the FRIARS study area boundary (Appendix 1 - Figure 6) on the basis that there have been a number of reports previously published by the EPA concerned with the marine environment and port proposals in Cockburn Sound. These reports include the EPA's *Strategic Environmental Assessment of Port and Harbour Development Scenarios in Cockburn Sound* (EPA, 1998d), *Southern Metropolitan Coastal Waters Study 1991-1994* (DEP, 1996) and the EPA's Position Paper *Sustainable Development and the Kwinana Industrial Area* (EPA, 1993d). These reports will be referred to by the EPA when assessing future port proposals and other developments in Cockburn Sound and should also be referred to by decision making authorities when considering proposals that are likely to impact on Cockburn Sound.

This report does not constitute a formal assessment under Part IV of the Environmental Protection Act. It is an assessment under Section 16 of the Environmental Protection Act which does not lead to the setting of legally binding environmental conditions. In compiling this report, the EPA has considered the information in FRIARS, specialist advice from the DEP and other government agencies, the EPA's own research and, in some cases, research provided by other experts.

2. Background

The KIA is Western Australia's largest heavy industrial site and is one of Western Australia's strategic industrial areas. The KIA was established in the early 1950's and now has a total area of 2,305 hectares, with 319 hectares remaining vacant. It is generally recognised that the KIA may reach full capacity in 5 to 10 years unless it is expanded for further new heavy industrial development (FRIARS, 1999).

FRIARS anticipates that there will also be a demand for general industrial sites in the Fremantle-Rockingham region due to the proximity of the Port of Fremantle and the site of the proposed new port facilities. It is predicted by FRIARS that 1,461 hectares of general industrial land will be required in the south west corridor over the next 25 years. The anticipated growth in heavy and general industry requires planning to ensure industrial areas are suitably located with access to necessary infrastructure, including port and rail facilities.

FRIARS addresses long term land use within the *Kwinana Environmental Protection (Atmospheric Waste) Policy* buffer area (FRIARS, 1999). A number of land use options for the buffer areas are examined in FRIARS. There are some elements common to all the options, including:

- the proposed alignment for Rowley Road and realignment for the Fremantle-Rockingham Highway; and

- the importance of Thomson's Lake Nature Reserve and Harry Waring Reserve; and
- an area of rural residential lots is retained to the west of these environmental areas;

The options outlined in FRIARS are summarised below and in Table 1.

Option 1: No change

This option is based on no change in land use. There will be further development within existing industrial zones, however, there would be no expansion of heavy or general industry land use within the Kwinana-Rockingham Region. Existing residential development would remain in Hope Valley and Wattleup townsites. (refer to Appendix 1- Figure 1).

Option 2: Mixed-Use Development

This option provides for the development of about 262 hectares of general industrial land within the Kwinana EPP buffer, in an area east of Wattleup. No additional heavy industry is planned. Residential developments at Hope Valley and Wattleup would remain, along with the rural areas (refer to Appendix 1- Figure 2).

Option 3a: General Industrial Use

This option provides for the development of about 873 hectares of general industrial land within the Kwinana EPP buffer. The residential area of Hope Valley and rural residential areas east and north east of Wattleup would will be developed for industrial purposes. The townsite of Wattleup would be retained. (refer to Appendix 1- Figure 3).

Option 3b: General/Heavy Industrial Use

Similar to Option 3a, except that Hope Valley and Naval Base would be used for heavy industrial purposes rather than general industry. Approximately 775 hectares of general industrial land and 98 hectares of heavy industrial land would be developed. The townsite of Wattleup would be also be retained under this option (refer to Appendix 1- Figure 4).

Option 4: Integrated Industrial Expansion - No townsites

Similar to Option 3b, except that Wattleup would also be redeveloped for general industrial purposes. This will create 899 hectares of general industry and an additional 98 hectares for heavy industry (refer to Appendix 1- Figure 5).

Option 4 is the preferred choice in FRIARS.

3. Status and purpose of the advice

The EPA's comments and advice contained in this report are provided under Section 16 (j) of the Environmental Protection Act which enables the EPA "to publish reports on environmental matters generally".

In its consideration of FRIARS, the EPA acknowledges that once finalised the Strategy's implementation will be through subsequent statutory planning instruments such as the Metropolitan Region Scheme, town planning schemes or specific project proposals. The primary purpose of the EPA's advice is to ensure that FRIARS adequately considers the appropriate environmental issues and EPA objectives and criteria when determining which land use options should be adopted. The EPA's advice is also intended to identify environmental matters which require the draft recommendations contained in FRIARS to be modified prior to finalisation; and environmental issues and factors which will require further consideration during subsequent statutory planning processes so that the environment will be adequately protected.

It is expected that the Metropolitan Region Scheme, town planning schemes, any amendments to these schemes and specific project proposals will incorporate the EPA's advice contained in

this report. Future schemes and projects may also need to be assessed by the EPA pursuant to the provisions of the Environmental Protection Act.

Table 1: Summary of FRIARS land use options

Option 1	
Element	**Proposed land use in buffer area**
Existing residential/ rural residential	No change
General industry	No Change
Heavy industry	No Change
Regional Roads	additional roads proposed
Option 2	
Existing residential/rural residential	No change
General industry	additional 262 ha
Heavy industry	No Change
Regional Roads	additional roads proposed
Option 3a	
Existing residential/rural residential	Wattleup retained - all other residential areas redeveloped
General industry	additional 873 ha
Heavy industry	No change
Regional Roads	additional roads proposed
Option 3b	
Existing residential/rural residential	Wattleup retained - all other residential areas redeveloped
General industry	additional 775 ha
Heavy industry	additional 98 ha
Regional Roads	additional roads proposed
Option 4	
Existing residential/rural residential	All residential areas redeveloped
General industry	additional 899 ha
Heavy industry	additional 98 ha
Regional Roads	additional roads proposed

4. Environmental considerations

The four land use options, one sub-option and proposed transport routes raise a number of environmental issues and factors. This report contains the EPA's environmental assessment and advice on the options and recommendations contained in FRIARS.

Table 3, summarises the EPA's advice for the four land use options and one sub-option.

Section 4 discusses the environmental issues and factors relevant to the options and transport routes contained in FRIARS. Firstly the environmental issues and factors are discussed followed by an assessment of how each of the options meets the environmental objectives for each of the factors. EPA advice is then provided in relation to how each of the options meets the environmental objectives; which environmental matters require the draft recommendations

Table 3: Summary of environmental issues and factors in relation to the land use options

Issue	Factor	EPA Objective	EPA criteria or management measures	Predicted Environmental Impact				
				Option 1	Option 2	Option 3a	Option 3b	Option 4
				residence				
				• Wattleup, Hope Valley, Naval Base and special rural in Area B	• Wattleup, Hope Valley, Naval Base and special rural in Area B.	• Only Wattleup and special rural retained in Area B	• Only Wattleup and special rural retained in Area B	•All residences in Area B removed except special rural lots.
				industry				
				•No expansion of heavy or general industry	•additional 262ha general industry	• 873ha general industry	• 775ha general industry •98ha heavy industry	•899ha general industry •98ha heavy industry
				infrastructure				
				•Proposed road, rail and port facilities	•Proposed road, rail and port facilities	•Proposed road, rail and port facilities	•Proposed road, rail and port facilities	•Proposed road, rail and port facilities
Pollution								
Buffer requirements for air quality, noise & risk	Air quality	To ensure that air emissions do not adversely affect the environment or health, welfare and amenity of surrounding residences by meeting statutory requirements and acceptable standards.	•Kwinana EPP •NEPM for Ambient Air Quality •Draft State Air EPP •Part V EP Act	• Existing residences are located within the EPP buffer. Air quality within the buffer currently meets the Kwinana EPP standards and the EPA's air quality objective; • Sulfur dioxide licences take up the full capacity of the Kwinana airshed; and • For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for industries emitting sulfur dioxide if there is to be further industrial development within the KIA in the long term.	• Existing residences are located within the EPP buffer. Air quality within the buffer currently meets the Kwinana EPP standards and the EPA's air quality objectives; • Existing residences within the buffer may constrain additional industrial development within the existing KIA; and • For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for industries emitting sulfur dioxide if there is to be further industrial development within the KIA in the long term.	• Existing residences (Wattleup) are located within the EPP buffer. Air quality within the buffer currently meets the Kwinana EPP standards and the EPA's air quality objective; • Existing residences (Wattleup) within the buffer may constrain additional development within the existing KIA; and • For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for industries emitting sulfur dioxide if there is to be further industrial development within the KIA in the long term.	• Existing residences (Wattleup) are located within the EPP buffer. Air quality within the buffer currently meets the Kwinana EPP standards and the EPA's environmental objective, however, there is potential for existing residences to be subject to unacceptable air quality from proposed expansion of heavy industry in Option 3b;. • Existing residences (Wattleup) within the buffer may constrain the proposed expansion of heavy industry; and • For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for industries emitting sulfur dioxide if there is to be further industrial development or expansion of the KIA in the long term.	• As most residences will be removed from Kwinana EPP buffer there will be minimal land use conflicts within the buffer between heavy industry and residential areas; • There will be a need to introduce land use controls on the rural residential lots still remaining within the buffer; • Option 4 can meet the EPA's air quality objective; and • For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for industries emitting sulfur dioxide if there is to be further industrial development or expansion of the KIA in the long term.

Table 3: Summary of environmental issues and factors in relation to the land use options

	Odour	Ensure that odour emissions, both individually and cumulatively, meet appropriate critieria and do not impact on public amenity or cause incompatible landuses.	•Draft Guidance Statement for Env Odour	• Existing residences are located within the EPP buffer; and • Existing residences within the buffer may constrain industrial expansion or additional industrial development within the existing KIA.	• Existing residences are located within the EPP buffer; and • Existing residences within the buffer may constrain additional industrial development within the existing KIA.	• Existing residences (Wattleup) are located within the EPP buffer; and • Existing residences (Wattleup) within the buffer may constrain additional development within the existing KIA.	• Existing residences (Wattleup) are located within the EPP buffer. • There is potential for existing residences to be subject to unacceptable odour from proposed expansion of heavy industry in Option 3b; and • Existing residences (Wattleup) within the buffer may constrain the proposed expansion of heavy industry.	• As most residences will be removed from Kwinana EPP buffer there will be minimal land use conflicts within the buffer between heavy industry and residential areas; and • There will be a need to introduce land use controls on the rural residential lots still remaining within the buffer.
	Noise	To protect the amenity of nearby residents from noise impacts resulting from industrial activities by ensuring that noise levels meet statutory requirements and acceptable standards.	•Noise Regulations •Draft Guidance Statement for Env Noise •Part V EP Act	• Noise levels at noise sensitive premises near the KIA comply with the Noise Regulations and the EPA's noise objective; • The Noise Regulations allow higher levels of noise at noise sensitive premises in the Kwinana EPP buffer (Area B) than outside of the buffer; • Existing residences within the buffer may constrain additional industrial development within the existing KIA; • Additional road and rail traffic in the KIA may cause conflicts with existing residents; and • Option 1 can meet the EPA's noise objectives in the short term but may not be able to meet these objectives in the long term due to additional industrial development and road and rail traffic. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's noise objectives in the long term.	• Noise levels at noise sensitive premises near the KIA comply with the Noise Regulations and the EPA's noise objectives; • Existing residences within the buffer may constrain additional industrial development within the existing KIA; • Additional road and rail traffic in the KIA may cause conflicts with existing residents; and • Option 2 can meet the EPA's noise objectives in the short term but may not be able to meet these objectives in the long term due to additional industrial development and road and rail traffic. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.	• Noise levels at noise sensitive premises near the KIA comply with the Noise Regulations and the EPA's noise objectives; • Existing residences (Wattleup) located within the buffer may constrain additional development within the existing KIA; • Additional road and rail infrastructure and traffic in the KIA may cause conflicts with existing residents; and • Option 3a may not be able to meet the EPA's environmental noise objectives due to the additional road and rail traffic. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's noise objective.	• Noise levels at noise sensitive premises near the KIA currently comply with the Noise Regulations and the EPA's noise objectives; • Existing residences within the buffer may constrain the proposed expansion heavy industry; • Additional road and port infrastructure in the KIA may cause conflicts with existing residents; and • The expansion of heavy industry and additional road and rail traffic may not be able to meet the EPA's environmental noise objectives due to the presence of residences in the Kwinana EPP buffer. Heavy industrial development and expansion of the KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.	• As most residences will be removed from Kwinana EPP buffer there will be minimal noise conflicts between heavy industry and residential areas. • Option 4 can meet the EPA's noise objective; and • The EPA's noise objectives will not constrain industrial development or expansion of the KIA in the long term.

Table 3: Summary of environmental issues and factors in relation to the land use options

	Risk	To prevent, abate and control off-site risk from hazardous industrial plant for the protection and management of the environment.	•Preliminary Guidance Statement No2 Risk Assessment and Management •Part IV EP Act	• Existing land uses near the KIA comply with the EPA's risk criteria and objective; • Existing residences within the buffer may constrain additional industrial development within the existing KIA; • Additional road and rail traffic may increase risks for existing residents; and • Option 1 can meet the EPA's risk objectives in the short term but may not be able to meet these objectives in the long term. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.	• Existing land uses near the KIA comply with the EPA's risk criteria and objectives; • Existing residences within the buffer may constrain additional industrial development within the existing KIA; • Additional road and rail traffic may increase risks for existing residents; and • Option 2 can meet the EPA's risk objective in the short term but may not be able to meet these objectives in the long term. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.	• Existing land uses near the KIA comply with the EPA's risk criteria and objectives; • Existing residence (Wattleup) located within the buffer may constrain additional industrial development within the existing KIA; • Additional road and rail traffic may increase risks for existing residents; and • Option 3a can meet the EPA's risk objectives in the short term but may not be able to meet these objectives in the long term if there is additional industrial development in the existing KIA and new transport routes are developed. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.	• Existing land uses near the KIA comply with the EPA's risk criteria and objectives; • Additional road and rail traffic may increase risks for existing residents; and • The expansion of heavy industry proposed as part of Option 3b may not be able to meet the EPA's environmental risk objectives in the long term. Heavy industrial development and expansion of the KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.	• As most residences will be removed from Kwinana EPP buffer there will be minimal land use conflicts in the buffer between heavy industry and residential areas. • Subject to new industries meeting the EPA's risk critieria both for the facility and in a cumulative assessment with other industry Option 4 can meet the EPA's risk objective; and • The EPA's risk objectives are capable of being met by future industrial development or expansion of the KIA in the long term.
Protecting ground water quality and preventing adverse impacts on Cockburn Sound	Ground water quality	To protect the quality of groundwater to prevent groundwater pollution from impacting adversely on Cockburn Sound and other environmental uses. (EPA, 1993).	•Part IV & V EP Act	• Impacts from existing horticultural activities on groundwater quality will be maintained; and • There will be no additional sources of contamination of groundwater;	• The proposed increase in general industrial land in Option 2 would require specific controls to ensure groundwater is protected; and • Indirect physical impacts on groundwater quality from horticultural activities will be maintained.	• The proposed increase in general industrial land in Option 3a would require specific controls to ensure groundwater is protected; and • Indirect physical impacts on groundwater quality from horticultural activities will be reduced.	• The proposed increase in general industrial land in Option 3a would require specific controls to ensure groundwater is protected; • There may be additional cumulative impacts from heavy industry on groundwater quality unless comprehensive groundwater controls are incorporated into new projects; and • Indirect physical impacts on groundwater quality from horticultural activities will be reduced.	• There may be additional cumulative impacts from heavy industry on groundwater quality unless comprehensive groundwater controls are incorporated into new projects; • An increase in general industrial land would require specific controls to ensure groundwater is protected; and • Indirect physical impacts on groundwater quality from horticultural activities will be reduced.

Table 3: Summary of environmental issues and factors in relation to the land use options

Biophysical								
Protecting regionally significant wetlands and vegetation	Regionally significant wetlands and vegetation	To maintain the integrity, functions and environmental values of regionally significant wetlands To maintain the abundance, diversity, geographical distribution and productivity of regionally significant vegetation communities..	•Perth's Bushplan •Lakes EPP •Conservation category wetlands	• All EPP Lakes, Conservation category wetlands and most Perth Bushplan sites are adequately reserved & protected in FRIARS; and • FRIARS proposes no additional direct impacts on regionally significant wetlands or remnant vegetation	• All EPP Lakes, Conservation category wetlands and most Perth Bushplan sites are adequately reserved & protected in FRIARS; and • FRIARS proposes no additional direct impacts on regionally significant wetlands or remnant vegetation	• All EPP Lakes, Conservation category wetlands and most Perth Bushplan sites are adequately reserved & protected in FRIARS; • Increase in potential indirect impacts on Mt Brown Lake and Long Swamp; and • An appropriate buffer and land use management plan will be required between the industrial areas and these wetlands.	• All EPP Lakes, Conservation category wetlands and most Perth Bushplan sites are adequately reserved & protected in FRIARS; • Increase in potential indirect impacts on Mt Brown Lake and Long Swamp; and • An appropriate buffer and land use management plan will be required between the industrial areas and these wetlands.	• All EPP Lakes, Conservation category wetlands and most Perth Bushplan sites are adequately reserved & protected in FRIARS; • Increase in potential indirect impacts on Mt Brown Lake and Long Swamp; and • An appropriate buffer and land use management plan will be required between the industrial areas and these wetlands.

contained in FRIARS to be modified prior to finalisation; and which environmental factors will require further consideration during subsequent statutory planning processes so that the environment will be adequately protected.

4.1 Heavy and general industry

The main environmental issues and factors raised by the heavy industry and general industrial components of FRIARS are summarised in Table 2 below:

Table 2: Environmental issues and factors raised by the expansion of heavy and general industry in the Fremantle-Rockingham region.

ISSUE	FACTOR	EPA OBJECTIVE
Pollution		
Buffer requirements for air quality, odour, noise & risk	Air quality	To ensure that air emissions do not adversely affect the environment or health, welfare and amenity of surrounding residences by meeting statutory requirements and acceptable standards.
	Odour	Ensure that odour emissions, both individually and cumulatively, meet appropriate criteria and do not impact on public amenity or cause incompatible landuses.
	Noise	To protect the amenity of nearby residents from noise impacts resulting from industrial activities by ensuring that noise levels meet statutory requirements and acceptable standards.
	Risk	To prevent, abate and control off-site risk from hazardous industrial plant for the protection and management of the environment.
Protecting groundwater quality	Groundwater quality	To protect the quality of groundwater to prevent groundwater pollution from impacting adversely on Cockburn Sound and other environmental uses.
Biophysical		
Protecting regionally significant wetlands and vegetation	Regionally significant wetlands	To maintain the integrity, functions and environmental values of regionally significant wetlands.
	Regionally significant vegetation	To maintain the abundance, diversity, geographical distribution and productivity of regionally significant vegetation communities.

Buffer requirements for air quality, odour, noise and risk

Air quality

The EPA's objective is to ensure that air emissions do not adversely affect the environment or health, welfare and amenity of surrounding land uses by meeting statutory requirements and acceptable standards.

In common with heavy industrial areas around the world, Kwinana industries have in the past caused air quality problems. The most significant air quality issue to have arisen at Kwinana is the discharge of sulfur dioxide. In 1974 the Coogee Air Pollution Study identified the unsuitability of land adjacent to the KIA for urban development due to air pollution, and it foreshadowed the need for the Kwinana Air Modelling Study (DCE, 1982) to better understand the air pollution characteristics on a broad scale.

Sulfur dioxide emissions reduced dramatically when natural gas became available at Kwinana in 1984 and still further when sulfur recovery equipment was installed at the BP Refinery. However, for a variety of reasons, emissions of sulfur dioxide showed an upward trend in the late 1980's. In response to this the EPA initiated development of the *Kwinana Environmental Protection (Atmospheric Wastes) Policy*, which was gazetted on 17 July 1992 (DEP, 1999).

The current air quality, as measured at six monitoring stations located inside and outside of the buffer area, is acceptable relative to the standards set under the Kwinana EPP and the recently approved NEPM for Ambient Air Quality. However, the combined industries in the KIA have the capacity to cause atmospheric sulfur dioxide concentrations well in excess of the Kwinana EPP standards (DEP pers comm, 1998) and sulfur dioxide licences take up the full capacity of the Kwinana airshed.

Kwinana Environmental Protection (Atmospheric Wastes) Policy

The principal objective of the Kwinana EPP was to declare, under the Environmental Protection Act, the beneficial uses of air within the Kwinana airshed and to establish a consistent regulatory framework to protect these uses.

Sulfur dioxide has been the most significant air pollutant at Kwinana and has been the primary basis to determine the extent of the Kwinana EPP buffer because its impact extends further than particulates and is the principal environmental factor controlling the extent of the environmental buffer.

A simple overview of how the Kwinana EPP works is as follows:

- it sets ambient standards and limits for sulfur dioxide and total suspended particulates for three defined areas within the policy area, namely an industrial area (Area A), a buffer area (Area B) and the rural residential area (Area C) beyond the buffer area (refer to Appendix 1- Figure 7);

- it provides a means whereby enforceable limits may be placed on the emissions from industrial sources such that the ambient standards and limits will be achieved and complied with; and

- it provides for ongoing monitoring, assessment and, if necessary, redetermination of the emissions limits if these are found to be too high or too restrictive. It also provides for redetermination of emission limits to accommodate a new source of emissions or a change within an existing industry.

In 1992 when the initial determination of sulfur dioxide emission limits was made under the Kwinana EPP, the variability of emission from many of the industries had not been quantified. Consequently, some of the emission limits were expressed as constant upper limits. The "air space" was fully allocated using these emission limits. In reality, because emissions are below the upper limits most of the time, the sulfur dioxide concentrations in the environment are well less than the EPP ambient standards and limits (as confirmed by results from monitoring stations). In other words, some additional sulfur dioxide emissions can be safely accommodated. However, to comply with the management procedure of the EPP, there will need to be a redetermination of current emission limits, properly accounting for emission variability, before significant additional emissions of sulfur dioxide can be introduced into the EPP area.

Section 36(1)(b) of the Environmental Protection Act requires the EPA to review the Kwinana EPP and prepare a revised draft EPP for transmittal to the Minister for the Environment by 17 July 1999.

After a preliminary review of the effectiveness of the 1992 Kwinana EPP and the status of air quality at Kwinana, the EPA decided to initiate public consultation on the proposition that the Kwinana EPP be re-issued unchanged. This decision reflected the fact that the Kwinana EPP has been successful since 1992 in protecting air quality in the Kwinana area and complies with the National Environmental Protection Measure for Ambient Air Quality (EPA, 1999). The EPA envisages that the Kwinana EPP will be replaced by a State Air EPP in the near future. The closing date for submissions was the 9 April 1999.

One of the principle expressions of concern has been that industry has reduced the levels of sulfur dioxide thus providing the opportunity for the buffer line to be reduced. The EPA intends to finalise the revision of the Kwinana EPP in the later half of 1999.

National Environmental Protection Measure for Ambient Air Quality

The National Environmental Protection Measure for Ambient Air Quality (NEPM) was approved by the National Environmental Protection Council (NEPC) in June 1998. In brief, the NEPM sets standards for six common air pollutants (carbon monoxide, nitrogen oxide, photochemical oxidant, sulfur dioxide, lead and particulates) and requires the monitoring and reporting of concentrations of these pollutants according to a protocol which, at the time of writing of this paper, is under development.

The NEPM itself does not direct States and Territories as to how compliance with NEPM standards should be achieved. The NEPM establishes a goal of compliance with its standards within ten years, and the National Environment Protection Council (Western Australia) Act 1996 includes a commitment to implement each NEPM "by such laws and other arrangements as are necessary".

State Air Environmental Protection Policy

The proposed State Air Environmental Protection Policy (State Air EPP), in its initial form, will most likely be limited to implementing the standards for the six NEPM pollutants, with provision for other pollutants to be added subsequently. The State Air EPP will give effect to the NEPM for Ambient Air Quality in Western Australia.

Odour

Ensure that odour emissions, both individually and cumulatively, meet appropriate criteria and do not impact on public amenity or cause incompatible landuses.

"The EPA's position on odour management is that where odour impacts associated with the development of new industrial facilities, the new facility should be designed using best practicable engineering design and operated using best practice management systems."(EPA, 1999c).

The overall objectives in the management of odorous industries/facilities are:

- to minimise odour emissions and their impacts;
- to ensure that the odorous industries/facilities and land use planning in the vicinity meet acceptable criteria for individual exposures and that land use compatibility in relation to separation distances is established in the planning process;
- to ensure the industry continues to operate in such a manner that the odour emissions are managed within the accepted criteria; and
- application of principles of risk management, given the current poor understanding behind odours and potential health effects.

The EPA acknowledges that under the requirements of the State Industrial Buffer Policy (WAPC, 1997) and Draft Guidance Statement No 3 (EPA, 1997) significant amounts of land are required as a buffer around odour sensitive land uses. The EPA also recognises that if odour sensitive land uses are permitted in the vicinity of established odour sources, conflicts are likely to occur.

It is the EPA opinion that proponents of sensitive land use developments near existing odour sources should demonstrate acceptable odour impacts on the proposed development. This will provide consistent protection of public amenity from odours over the long term.

Noise

The EPA's objective is to protect the amenity of nearby residents from noise impacts resulting from industrial activities by ensuring that noise levels meet statutory requirements and acceptable standards.

Industry is currently required to adhere to the Environmental Protection (Noise) Regulations 1997, which set maximum allowable noise levels at noise sensitive, industrial and commercial premises. Land uses within the boundary of Area B of the Kwinana EPP are especially referred to in the Noise Regulations as Type B land uses for the purposes of determining the influencing factor for noise received at noise receiving premises. This effectively raises the permissible noise levels at noise sensitive premises located within Area B. The Draft Kwinana Industrial Area Central Core Environmental Strategy (BSD Consultants, 1998) indicates that noise levels at Wattleup from existing industry are well within allowable levels. At Hope Valley, North Rockingham and Medina, noise levels are at the limits of allowable levels. Additional industry in these areas will need to be strictly managed to ensure compliance with the Noise Regulations.

Risk

The EPA's objective is to prevent, abate and control off-site risk from hazardous industrial plant for the protection and management of the environment.

There are two primary measures of risk employed with respect to human safety, individual risk and societal risk. Individual risk is a measure of the frequency, per year, that an individual will experience a specified level of harm. Societal risk is a measure of the frequency per year that specified numbers of individuals within a community or population as a whole will sustain a specified level of harm.

The EPA has adopted criteria for individual risk and is in the process of developing criteria for societal risk.

The EPA's *Preliminary Guidance No. 2: Risk Assessment and Management: Offsite Individual Risk from Hazardous Industrial Plant* (March 1998) has set the off-site individual risk criteria for fatalities from hazardous industrial plant at the following levels:

(a) A risk level in residential zones of one in a million per year or less, is so small as to be acceptable to the EPA.

(b) A risk level in "sensitive developments", such as hospitals, schools, child care facilities and aged care housing developments of one half in a million per year or less is so small as to be acceptable to the EPA.

In the case of risk generators within the grounds of the sensitive development necessary for the amenity of the residents, the risk level can exceed the risk level of one half in a million per year up to a maximum of one in a million per year, for areas that are intermittently occupied, such as garden areas and car parks.

(c) Risk levels from industrial facilities should not exceed a target of fifty in a million per year at the site boundary for each individual industry, and the cumulative risk level imposed upon an industry should not exceed a target of one hundred in a million per year.

(d) A risk level for any non-industrial activity located in buffer zones between industrial facilities and residential zones of ten in a million per year or less, is so small as to be acceptable to the EPA.

(e) A risk level for commercial developments, including offices, retail centres and showrooms located in buffer zones between industrial facilities and residential zones, of five in a million per year or less, is so small as to be acceptable to the Environmental Protection Authority.

All hazardous industries built in the KIA since 1985 have provided a preliminary risk assessment to the EPA as part of the environmental impact assessment process.

In 1987, the Department of Resources Development (DRD) commissioned a study of the cumulative effects of risk for the whole of the KIA. The study showed that the cumulative risk levels from the KIA met the EPA risk criteria. In 1991, the study was reviewed to take account of risk data and again the industrial area met the EPA's criteria.

The Kwinana Cumulative Risk Study was conducted in 1995 as an update to earlier studies and to plan for potential industries in the year 2020. The 1998 results showed that cumulative risk from existing industrial plants in 1994 and 2020 satisfied the EPA's criteria for existing residential areas. This study included the risk from gas pipelines and the road transport of dangerous goods.

The 1998 update conducted on behalf of DRD predicted risk levels in a full KIA development scenario at 2020 and included notional industries expanding into the Hope Valley area. This scenario included a notional integrated petrochemical plant and an aluminium trifluoride plant within the KIA. It also provided for development of industry in Naval Base and Hope Valley. Cumulative residential risk contours (1x10-6) for future development scenario in 2020 do not extend into Wattleup, and the EPA's residential criteria are met for individual risk at this location. However, if industry is located in Hope Valley and Naval Base the residential criteria are exceeded at these locations for the full development scenario.

Assessment of the land use options in relation to the environmental objectives for air quality, odour, noise and risk

Option 1

Air quality

- Existing residences are located within the EPP buffer. Air quality within the buffer currently meets the Kwinana EPP standards and the EPA's air quality objective;
- Sulfur dioxide licences take up the full capacity of the Kwinana airshed; and
- For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for industries emitting sulfur dioxide if there is to be further industrial development within the KIA in the long term.

Odour

- Existing residences are located within the EPP buffer; and
- Existing residences within the buffer may constrain industrial expansion or additional industrial development within the existing KIA.

Noise

- Noise levels at noise sensitive premises near the KIA comply with the Noise Regulations and the EPA's noise objective;
- The Noise Regulations allow higher levels of noise at noise sensitive premises in the Kwinana EPP buffer (Area B) than outside of the buffer;
- Existing residences within the buffer may constrain additional industrial development within the existing KIA;
- Additional road and rail traffic in the KIA may cause conflicts with existing residents; and
- Option 1 can meet the EPA's noise objectives in the short term but may not be able to meet these objectives in the long term due to additional industrial development and road and rail traffic. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's noise objectives in the long term.

Risk

- Existing land uses near the KIA comply with the EPA's risk criteria and objective;
- Existing residences within the buffer may constrain additional industrial development within the existing KIA;
- Additional road and rail traffic may increase risks for existing residents; and
- Option 1 can meet the EPA's risk objectives in the short term but may not be able to meet these objectives in the long term. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.

Option 2

Air quality

- Existing residences are located within the EPP buffer. Air quality within the buffer currently meets the Kwinana EPP standards and the EPA's air quality objectives;

- Existing residences within the buffer may constrain additional industrial development within the existing KIA; and
- For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for industries emitting sulfur dioxide if there is to be further industrial development within the KIA in the long term.

Odour

- Existing residences are located within the EPP buffer; and
- Existing residences within the buffer may constrain additional industrial development within the existing KIA.

Noise

- Noise levels at noise sensitive premises near the KIA comply with the Noise Regulations and the EPA's noise objectives;
- Existing residences within the buffer may constrain additional industrial development within the existing KIA;
- Additional road and rail traffic in the KIA may cause conflicts with existing residents; and
- Option 2 can meet the EPA's noise objectives in the short term but may not be able to meet these objectives in the long term due to additional industrial development and road and rail traffic. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.

Risk

- Existing land uses near the KIA comply with the EPA's risk criteria and objectives;
- Existing residences within the buffer may constrain additional industrial development within the existing KIA;
- Additional road and rail traffic may increase risks for existing residents; and
- Option 2 can meet the EPA's risk objective in the short term but may not be able to meet these objectives in the long term. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.

Option 3a

Air quality

- Existing residences (Wattleup) are located within the EPP buffer. Air quality within the buffer currently meets the Kwinana EPP standards and the EPA's air quality objective;
- Existing residences (Wattleup) within the buffer may constrain additional development within the existing KIA; and
- For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for industries emitting sulfur dioxide if there is to be further industrial development within the KIA in the long term.

Odour

- Existing residences (Wattleup) are located within the EPP buffer; and
- Existing residences (Wattleup) within the buffer may constrain additional development within the existing KIA.

Noise

- Noise levels at noise sensitive premises near the KIA comply with the Noise Regulations and the EPA's noise objectives;
- Existing residences (Wattleup) located within the buffer may constrain additional development within the existing KIA;
- Additional road and rail infrastructure and traffic in the KIA may cause conflicts with existing residents; and
- Option 3a may not be able to meet the EPA's environmental noise objectives due to the additional road and rail traffic. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's noise objective.

Risk

- Existing land uses near the KIA comply with the EPA's risk criteria and objectives;
- Existing residence (Wattleup) located within the buffer may constrain additional industrial development within the existing KIA;
- Additional road and rail traffic may increase risks for existing residents; and
- Option 3a can meet the EPA's risk objectives in the short term but may not be able to meet these objectives in the long term if there is additional industrial development in the existing KIA and new transport routes are developed. Heavy industrial development within the existing KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.

Option 3b

Air quality

- Existing residences (Wattleup) are located within the EPP buffer. Air quality within the buffer currently meets the Kwinana EPP standards and the EPA's environmental objective, however, there is potential for existing residences to be subject to unacceptable air quality from proposed expansion of heavy industry in Option 3b;
- Existing residences (Wattleup) within the buffer may constrain the proposed expansion of heavy industry; and
- For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for industries emitting sulfur dioxide if there is to be further industrial development or expansion of the KIA in the long term.

Odour

- Existing residences (Wattleup) are located within the EPP buffer.
- There is potential for existing residences to be subject to unacceptable odour from proposed expansion of heavy industry in Option 3b; and

- Existing residences (Wattleup) within the buffer may constrain the proposed expansion of heavy industry.

Noise

- Noise levels at noise sensitive premises near the KIA currently comply with the Noise Regulations and the EPA's noise objectives;
- Existing residences within the buffer may constrain the proposed expansion heavy industry;
- Additional road and port infrastructure in the KIA may cause conflicts with existing residents; and
- The expansion of heavy industry and additional road and rail traffic may not be able to meet the EPA's environmental noise objectives due to the presence of residences in the Kwinana EPP buffer. Heavy industrial development and expansion of the KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.

Risk

- Existing land uses near the KIA comply with the EPA's risk criteria and objectives;
- Additional road and rail traffic may increase risks for existing residents; and
- The expansion of heavy industry proposed as part of Option 3b may not be able to meet the EPA's environmental risk objectives in the long term. Heavy industrial development and expansion of the KIA may need to be constrained in order to meet the EPA's environmental objectives in the long term.

Option 4

Air quality

- As most residences will be removed from Kwinana EPP buffer there will be minimal land use conflicts within the buffer between heavy industry and residential areas;
- There will be a need to introduce land use controls on the rural residential lots still remaining within the buffer;
- Option 4 can meet the EPA's air quality objective; and
- For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for industries emitting sulfur dioxide if there is to be further industrial development or expansion of the KIA in the long term.

Odour

- As most residences will be removed from Kwinana EPP buffer there will be minimal land use conflicts within the buffer between heavy industry and residential areas; and
- There will be a need to introduce land use controls on the rural residential lots still remaining within the buffer.

Noise

- As most residences will be removed from Kwinana EPP buffer there will be minimal noise conflicts between heavy industry and residential areas.
- Subject to new industry adequately managing noise Option 4 can meet the EPA's noise objective; and

- The EPA's noise objectives need not be constrained by industrial development or expansion of the KIA in the long term.

Risk

- As most residences will be removed from Kwinana EPP buffer there will be minimal land use conflicts in the buffer between heavy industry and residential areas.
- Subject to new industries meeting the EPA's risk criteria both for the facility and in a cumulative assessment with other industry Option 4 can meet the EPA's risk objective; and
- The EPA's risk objectives are capable of being met by future industrial development or expansion of the KIA in the long term.

EPA advice in relation to air quality, odour, noise and risk

The EPA advises that:

- Option 4 would provide an adequate buffer between the existing/proposed heavy industrial area and surrounding sensitive land uses so that the EPA's environmental objectives and criteria in relation to air quality, odour, noise, and risk can be met, provided that additional planning controls are implemented to manage the remaining rural/residential areas within the buffer;

- Option 4 would improve the compatibility between land uses within the Kwinana EPP air quality buffer and allow the DEP to manage air quality, odour, noise and risk in a manner that and place fewer constraints on industrial activity;

- Options 1, 2, 3a and 3b may not provide an adequate buffer around the existing KIA when it is developed to its full potential, to meet the EPA's objectives and criteria for air quality, odour, noise and risk unless special land use controls are involved. Industrial development may need to be constrained in the long term in order to meet the EPA's objectives and criteria;

- sulfur dioxide licences currently take up the full capacity of the Kwinana airshed. For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for existing industries emitting sulfur dioxide if there is to be further industrial development within the KIA in the long term.

- the Kwinana EPP air quality buffer is required to provide a basis for management so that the EPA's environmental objectives can be met for noise and risk as well as air quality. The EPA would prefer that the buffer is called the Kwinana Industrial Buffer and is zoned appropriately so that it can be used as the basis for environmental management for all relevant environmental issues;

- the EPA supports the principle of implementing land use controls in the buffer area to prevent land use conflicts and ensure land use compatibility between heavy industry and sensitive land uses as promoted in FRIARS; and

- there will be a need to introduce land use controls for the rural residential lots still remaining within the buffer for all options.

The EPA also advises that the following environmental issues be deferred for assessment during subsequent statutory planning stages:

- new general industry proposals will need to be managed pursuant to Part V of the Environmental Protection Act and during subsequent statutory planning processes to meet the agreed environmental criteria for air quality, odour, noise and risk;

- new project proposals for heavy industry may need to be assessed under Part IV of the Environmental Protection Act and issued with a works approval and licence under Part V of the Act to determine compliance with the National Environmental Protection Measure for Ambient Air Quality (NEPM) as reflected in the Kwinana Air Quality EPP;

- new heavy industrial proposals in the KIA (including the new heavy industrial area identified in Options 3b and 4) involving a significant element of risk will need to provide a risk assessment to the EPA at an early stage of the environmental assessment process. Cumulative risk contours should also be updated ensuring that cumulative risk criteria would not be exceeded; and

- noise levels at the boundary of the Kwinana EPP buffer should comply with the Environmental Protection (Noise) Regulations 1997. Provisions should be incorporated in town planning schemes requiring that allowable noise levels be applied to the proposed heavy industrial areas in Options 3b and 4 to ensure that acceptable noise levels can be achieved within the buffer area pursuant to the Noise Regulations. The allowable noise levels should be modelled using the criteria outlined in the EPA's Draft Guidance Statement for Environmental Noise (EPA, 1998).

Protecting groundwater quality and preventing adverse impacts on Cockburn Sound

Groundwater quality

The EPA's objective is to protect the quality of groundwater to prevent groundwater pollution from impacting adversely on the marine ecology of Cockburn Sound and other environmental values.

The most severe groundwater contamination problems in industrial areas, including Kwinana, result from spills and leakages on industrial sites and from seepage from waste disposal lagoons.

The DEP has identified large groundwater plumes within the general area around the KIA resulting from industrial activity. These are primarily the result of previous waste disposal methods. The contaminants currently within the groundwater include ammonium sulphate, sodium hydroxide, hydrocarbons, nitrogen and herbicides. Groundwater contamination in the KIA has resulted in groundwater contributing 70 per cent of the total amount of nitrogen entering Cockburn Sound (DEP, 1996).

Management control of the various contaminated groundwater areas is being achieved through EPA licences for each industry. It is via these licences that various conditions are established under which each company must operate. Industry is required to undertake strategies deemed necessary to prevent groundwater pollution (EPA, 1993).

The EPA's strategy with respect to groundwater protection in industrial areas is to initiate and encourage long term disposal strategies which will not only ameliorate current pollution problems but will also prevent similar pollution episodes occurring in the future. Such strategies should include liquid effluent recycling programmes, waste minimisation and recovery programmes.

Assessment of land use options in relation to environmental objectives for groundwater quality

Option 1

Groundwater quality

- Impacts from existing horticultural activities on groundwater quality will be maintained; and

- There will be no additional sources of contamination of groundwater;

Option 2

Groundwater quality

- The proposed increase in general industrial land in Option 2 would require specific controls to ensure groundwater is protected; and
- Indirect physical impacts on groundwater quality from horticultural activities will be maintained.

Option 3a

Groundwater quality

- The proposed increase in general industrial land in Option 3a would require specific controls to ensure groundwater is protected; and
- Indirect physical impacts on groundwater quality from horticultural activities will be reduced.

Option 3b

Groundwater quality

- The proposed increase in general industrial land in Option 3a would require specific controls to ensure groundwater is protected;
- There may be additional cumulative impacts from heavy industry on groundwater quality unless comprehensive groundwater controls are incorporated into new projects; and
- Indirect physical impacts on groundwater quality from horticultural activities will be reduced.

Option 4

Groundwater quality

- There may be additional cumulative impacts from heavy industry on groundwater quality unless comprehensive groundwater controls are incorporated into new projects;
- An increase in general industrial land would require specific controls to ensure groundwater is protected; and
- Indirect physical impacts on groundwater quality from horticultural activities will be reduced.

EPA advice in relation to groundwater quality

The EPA advises that:

- the proposed expansion of heavy industry and general industry as depicted in Options 2, 3a, 3b and 4 will need to be carefully managed in order to avoid cumulative impacts on groundwater quality;
- groundwater quality will need to be managed through EPA assessments and DEP licences for each industry in Option 1, 2, 3a, 3b and 4; and
- on going contamination of groundwater from horticultural activities will occur but from a smaller land area in Options 2, 3a, 3b and 4.

The EPA also advises that the following environmental issues be deferred for assessment during subsequent statutory planning stages:

- criteria for groundwater quality, drainage and water balance should be adopted as part of the assessment of Metropolitan Region Scheme amendments to assist in the management and monitoring of future heavy and general industrial development; and

- new heavy industry proposals will need to be managed pursuant to the Environmental Protection Act to meet the agreed environmental criteria for groundwater quality in the context of the marine water quality criteria being set as part of the *Southern Metropolitan Coastal Waters Study.*

Protecting regionally significant wetlands and vegetation

Regionally significant wetlands and vegetation

The EPA's objective for wetlands is to maintain the integrity, functions and environmental values of regionally significant wetlands.

The EPA's objective for vegetation is to maintain the abundance, diversity, geographical distribution and productivity of regionally significant vegetation communities.

Regionally significant wetlands in the Fremantle-Rockingham region include those lakes protected by the Environmental Protection (Swan Coastal Plain Lakes) Policy (Lakes EPP) and wetlands identified as Conservation category wetlands in Perth's Bushplan. These wetlands are all situated within Regional Open Space reserves in the Metropolitan Region Scheme (refer Appendix 1 - Figure 6).

In all the land use options, there is a narrow strip of rural residential lots immediately west of Thomson's Lake which is proposed to be retained to provide separation between any future industrial development and Thomson's Lake Nature Reserve.

The regionally significant vegetation in the Fremantle-Rockingham region is identified in Perth's Bushplan. The majority of this bushland is situated within Regional Open Space reserves in the Metropolitan Region Scheme (refer Appendix 1 - Figure 6). The most appropriate mechanism for protecting the Perth Bushplan sites not included in regional open space will be considered during the public comment period of Perth's Bushplan in consultation with land owners.

The land use options presented in FRIARS do not propose changing the boundaries of the regional open space reservations. However, a significant area of industry is proposed in the vicinity of Mt Brown Lake and Long Swamp under Options 3a, 3b and 4. An appropriate buffer and land use management plan will be required between the industrial areas and these wetlands to prevent unacceptable impacts on either the water quality or the hydrology of the wetlands due to the change in land use.

These environmental issues will need to be carefully managed during subsequent statutory planning processes.

Assessment of land use options in relation to environmental objectives for regionally significant wetlands and vegetation

Option 1

Regionally significant wetlands and vegetation

- All EPP Lakes, Conservation category wetlands and most Perth Bushplan sites are adequately reserved & protected in FRIARS; and
- FRIARS proposes no additional direct impacts on regionally significant wetlands or remnant vegetation

Option 2

Regionally significant wetlands and vegetation

- All EPP Lakes, Conservation category wetlands and most Perth Bushplan sites are adequately reserved & protected in FRIARS; and
- FRIARS proposes no additional direct impacts on regionally significant wetlands or remnant vegetation

Option 3a

Regionally significant wetlands and vegetation

- All EPP Lakes, Conservation category wetlands and most Perth Bushplan sites are adequately reserved & protected in FRIARS;
- Increase in potential indirect impacts on Mt Brown Lake and Long Swamp; and
- An appropriate buffer and land use management plan will be required between the industrial areas and these wetlands.

Option 3b

Regionally significant wetlands and vegetation

- All EPP Lakes, Conservation category wetlands and most Perth Bushplan sites are adequately reserved & protected in FRIARS;
- Increase in potential indirect impacts on Mt Brown Lake and Long Swamp; and
- An appropriate buffer and land use management plan will be required between the industrial areas and these wetlands.

Option 4

Regionally significant wetlands and vegetation

- All EPP Lakes, Conservation category wetlands and most Perth Bushplan sites are adequately reserved & protected in FRIARS;
- Increase in potential indirect impacts on Mt Brown Lake and Long Swamp; and
- An appropriate buffer and land use management plan will be required between the industrial areas and these wetlands.

EPA advice in relation to regionally significant wetlands and vegetation

The EPA advises that:

- an appropriate buffer and land use management will be required between Mt Brown Lake and Long Swamp and the industrial areas identified in Option 2, 3a, 3b and 4 to prevent unacceptable impacts on either the water quality or the hydrology of the wetlands due to the change in land use; and
- Option 1 is likely to increase impacts on the regionally significant wetlands.

The EPA advises that the following environmental issues be deferred for assessment during subsequent statutory planning stages:

- subsequent planning instruments should adequately protect and also prevent incompatible land uses from locating near the EPP lakes, Conservation category wetlands and Perth Bushplan sites through the provision of compatible land uses and adequate buffers for incompatible land uses;

4.2 Transport routes

The main environmental issues and factors raised by the proposed transport routes identified in FRIARS are summarised in Table 4 below:

Table 4: Environmental issues and factors raised by the proposed transport routes in the Fremantle-Rockingham region.

ENVIRONMENTAL ISSUE	ENVIRONMENTAL FACTOR	EPA OBJECTIVE
Pollution		
Buffer requirements	Noise	To protect the amenity of nearby residents from noise impacts resulting from industrial activities by ensuring that noise levels meet acceptable standards.
	Air quality	To ensure that air emissions do not adversely affect the environment or health, welfare and amenity of surrounding residences by meeting statutory requirements and acceptable standards.
	Risk	To prevent, abate and control off-site risk from the transport of chemicals and hazardous goods for the protection and management of the environment.
Biophysical		
Protecting regionally significant wetlands and vegetation	Regionally significant wetlands	To maintain the integrity, functions and environmental values of regionally significant wetlands.
	Regionally significant vegetation	To maintain the abundance, diversity, geographical distribution and productivity of regionally significant vegetation communities.

Description

Major industrial areas, such as the KIA, require efficient transport links. FRIARS includes a number of proposals to provide for improved road links in the Fremantle-Rockingham region. These additional road routes and the anticipated increase in rail transport are likely to conflict with existing sensitive land uses due to additional transport noise and risks associated with transporting hazardous goods.

FRIARS includes the following new or realigned transport routes, some of which the EPA are currently preparing advice on or assessing:

- the realignment of the Fremantle-Rockingham Controlled Access Highway; around proposed Jervoise Bay development and avoiding the proposed Beeliar Regional Park.

The EPA is currently preparing advice for Main Roads Western Australia on the environmental issues concerning the Fremantle-Rockingham Controlled Access Highway pursuant to Section 16 of the Environmental Protection Act.

- realignment of Cockburn Road around the Port Catherine development;

  The EPA is currently 'formally' assessing Metropolitan Region Scheme Amendment 1010/33 (which includes the realignment of Cockburn Road around the Port Catherine Development) pursuant to Divisions 3 of Part IV of the Environmental Protection Act.

- the Fremantle Eastern Bypass;

  The EPA is currently formally assessing the likely environmental impacts of the Fremantle Eastern Bypass on Clontarf Hill pursuant to Division 1 of Part IV of the Environmental Protection Act.

- the upgrading of Rowley and Anketell Roads including extensions into the KIA for improved future access.

  This road alignment should be referred to the EPA for assessment during subsequent statutory planning processes (ie MRS amendment). The proposed alignment of Rowley Road is likely to impact on existing residents in Wattleup.

Reference should be made to these assessments or advice during the finalisation and during subsequent statutory planning processes.

To allow the EPA to assess the proposed alignment of Rowley Road, Fremantle-Rockingham Controlled Access Highway and any other proposed regional transport routes in the Fremantle-Rockingham region further information will be required in relation to the following environmental factors:

Noise

Further information will be required on the likely impacts of noise on land uses surrounding the proposed transport routes.

Transport infrastructure and routes are not covered by the Environmental Protection (Noise) Regulations 1997. However, guidelines are being developed by the EPA to help determine acceptable levels of transport noise. Further residential areas and other sensitive land uses should be adequately setback from the railway line.

Risk

Further information will be required on the likely risks to the environment and surrounding land uses associated with the transport of chemicals and hazardous goods. Specific information will be required concerning drainage management in the event of accidental spillage.

Goundwater quality

There is a possible risk arising from major transport in the vicinity of the Jandakot Mound causing contamination of groundwater (Appendix 1 - Figure 8).

Regionally significant vegetation

Additional information is required for the EPA to determine the likely environmental impacts on regionally significant vegetation.

Regionally significant wetlands

Additional information is required for the EPA to determine the likely environmental impacts on regionally significant wetlands (EPP Lakes and Conservation category wetlands).

EPA advice in relation to transport facilities in FRIARS

The EPA advises that:

- the alignment of the proposed transport routes should not be finalised until the EPA has completed an environmental assessment pursuant to Part IV of the Environmental Protection Act;
- there should no additional major transport routes across the Jandakot Mound and associated Environmental Management Areas (Appendix 1-Figure 8); and
- the risks associated with the transport of hazardous goods to the KIA should be considered during subsequent statutory planning processes.

5. Conclusions and recommendations

The intent of the EPA's advice is to:

- assess each of the options in FRIARS in terms of the EPA's environmental objectives and criteria.
- ensure FRIARS adequately recognises and considers appropriate environmental issues;
- identify the environmental matters which requires FRIARS to be modified prior to finalisation; and
- identify the environmental matters which will require further consideration during subsequent statutory planning processes (ie. Metropolitan Region Scheme and town planning scheme amendments, subdivision and development proposals) so that the environment will be adequately protected.

The EPA will also use the advice provided in this report when assessing subsequent statutory planning instruments (ie. Metropolitan Region Scheme amendments) and development proposals.

The EPA's recommendations in relation to FRIARS are summarised as follows:

Heavy and general industry

In relation to buffer requirements for air quality, odour, noise and risk the EPA advises that:

- Option 4 would provide an adequate buffer between the existing/proposed heavy industrial area and surrounding sensitive land uses so that the EPA's environmental objectives and criteria in relation to air quality, odour, noise, and risk can be met, provided that additional planning controls are implemented to manage the remaining rural/residential areas within the buffer;
- Option 4 would improve the compatibility between land uses within the Kwinana EPP air quality buffer and allow the DEP to manage air quality, odour, noise and risk in a manner that and place fewer constraints on industrial activity;
- Options 1, 2, 3a and 3b may not provide an adequate buffer around the existing KIA when it is developed to its full potential, to meet the EPA's objectives and criteria for air quality, odour, noise and risk unless special land use controls are involved. Industrial development may need to be constrained in the long term in order to meet the EPA's objectives and criteria;

- sulfur dioxide licences currently take up the full capacity of the Kwinana airshed. For the EPA's air quality objectives to be maintained there will need to be a redetermination of emission allocations for existing industries emitting sulfur dioxide if there is to be further industrial development within the KIA in the long term.

- the Kwinana EPP air quality buffer is required to provide a basis for management so that the EPA's environmental objectives can be met for noise and risk as well as air quality. The EPA would prefer that the buffer is called the Kwinana Industrial Buffer and is zoned appropriately so that it can be used as the basis for environmental management for all relevant environmental issues;

- the EPA supports the principle of implementing land use controls in the buffer area to prevent land use conflicts and ensure land use compatibility between heavy industry and sensitive land uses as promoted in FRIARS; and

- there will be a need to introduce land use controls for the rural residential lots still remaining within the buffer for all options.

In relation to protecting groundwater quality and subsequent impacts on marine water quality the EPA advises that:

- the proposed expansion of heavy industry and general industry as depicted in Options 2, 3a, 3b and 4 will need to be carefully managed in order to avoid cumulative impacts on groundwater quality;
- groundwater quality will need to be managed through DEP licences for each industry in Option 1, 2, 3a, 3b and 4; and
- on going contamination of groundwater from horticultural activities will occur but from a smaller land area in Options 2, 3a, 3b and 4.

In relation to protecting regionally significant wetlands and vegetation the EPA advises that:

- an appropriate buffer and land use management will be required between Mt Brown Lake and Long Swamp and the industrial areas identified in Option 2, 3a, 3b and 4 to prevent unacceptable impacts on either the water quality or the hydrology of the wetlands due to the change in land use; and
- Option 1 is likely to increase impacts on the regionally significant wetlands.

The EPA advises that the following environmental issues concerning heavy and general industry be deferred for assessment during subsequent statutory planning stages:

- new general industry proposals will need to be managed pursuant to Part V of the Environmental Protection Act and during subsequent statutory planning processes to meet the agreed environmental criteria for air quality, odour, noise, risk, regionally significant vegetation, regionally significant wetlands and groundwater quality;

- new project proposals for heavy industry may need to be assessed under Part IV of the Environmental Protection Act and issued with a works approval and licence under Part V of the Act to determine compliance with the National Environmental Protection Measure for Ambient Air Quality (NEPM) as reflected in the Kwinana Air Quality EPP;

- new heavy industrial proposals in the KIA (including the new heavy industrial area identified in Options 3b and 4) involving a significant element of risk will need to provide a risk assessment to the EPA at an early stage of the environmental assessment process. Cumulative risk contours should also be updated ensuring that cumulative risk criteria would not be exceeded;

- new heavy industry proposals will need to be managed pursuant to the Environmental Protection Act to meet the agreed environmental criteria for groundwater quality in the context of the marine water quality criteria being set as part of the *Southern Metropolitan Coastal Waters Study*;

- noise levels at the boundary of the Kwinana EPP buffer should comply with the Environmental Protection (Noise) Regulations 1997. Provisions should be incorporated in town planning schemes requiring that allowable noise levels be applied to the proposed heavy industrial areas in Options 3b and 4 to ensure that acceptable noise levels can be achieved within the buffer area pursuant to the Noise Regulations. The allowable noise levels should be modelled using the criteria outlined in the EPA's *Draft Guidance Statement for Environmental Noise* (EPA, 1998);

- criteria for groundwater quality, drainage and water balance should be adopted as part of the assessment of Metropolitan Region Scheme amendments to assist in the management and monitoring of future heavy and general industrial development; and

- subsequent planning instruments should adequately protect and also prevent incompatible land uses from locating near the EPP lakes, Conservation category wetlands and Perth Bushplan sites through the provision of compatible land uses and adequate buffers for incompatible land uses.

Transport

To allow the EPA to assess the proposed alignment of Rowley Road, Fremantle-Rockingham Controlled Access Highway and any other proposed regional transport routes in the Fremantle-Rockingham region further information will be required in relation to the following environmental factors:

Noise

Further information will be required on the likely impacts of noise on land uses surrounding the proposed transport routes.

Transport infrastructure and routes are not covered by the Environmental Protection (Noise) Regulations 1997. However, guidelines are being developed by the EPA to help determine acceptable levels of transport noise. Further residential areas and other sensitive land uses should be adequately setback from the railway line.

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Further information will be required on the likely risks to the environment and surrounding land uses associated with the transport of chemicals and hazardous goods. Specific information will be required concerning drainage management in the event of accidental spillage.

Groundwater quality

There is a possible risk arising from major transport in the vicinity of the Jandakot Mound causing contamination of groundwater (Appendix 1 - Figure 8).

Regionally significant vegetation

Additional information is required for the EPA to determine the likely environmental impacts on regionally significant vegetation.

Regionally significant wetlands

Additional information is required for the EPA to determine the likely environmental impacts on regionally significant wetlands (EPP Lakes and Conservation category wetlands).

The EPA advises that:

- the alignment of the proposed transport routes should not be finalised until the EPA has completed an environmental assessment pursuant to Part IV of the Environmental Protection Act;
- there should no additional major transport routes across the Jandakot Mound and associated Environmental Management Areas; and
- the risks associated with the transport of hazardous goods to the KIA should be considered during subsequent statutory planning processes.

Appendix 1

Figures

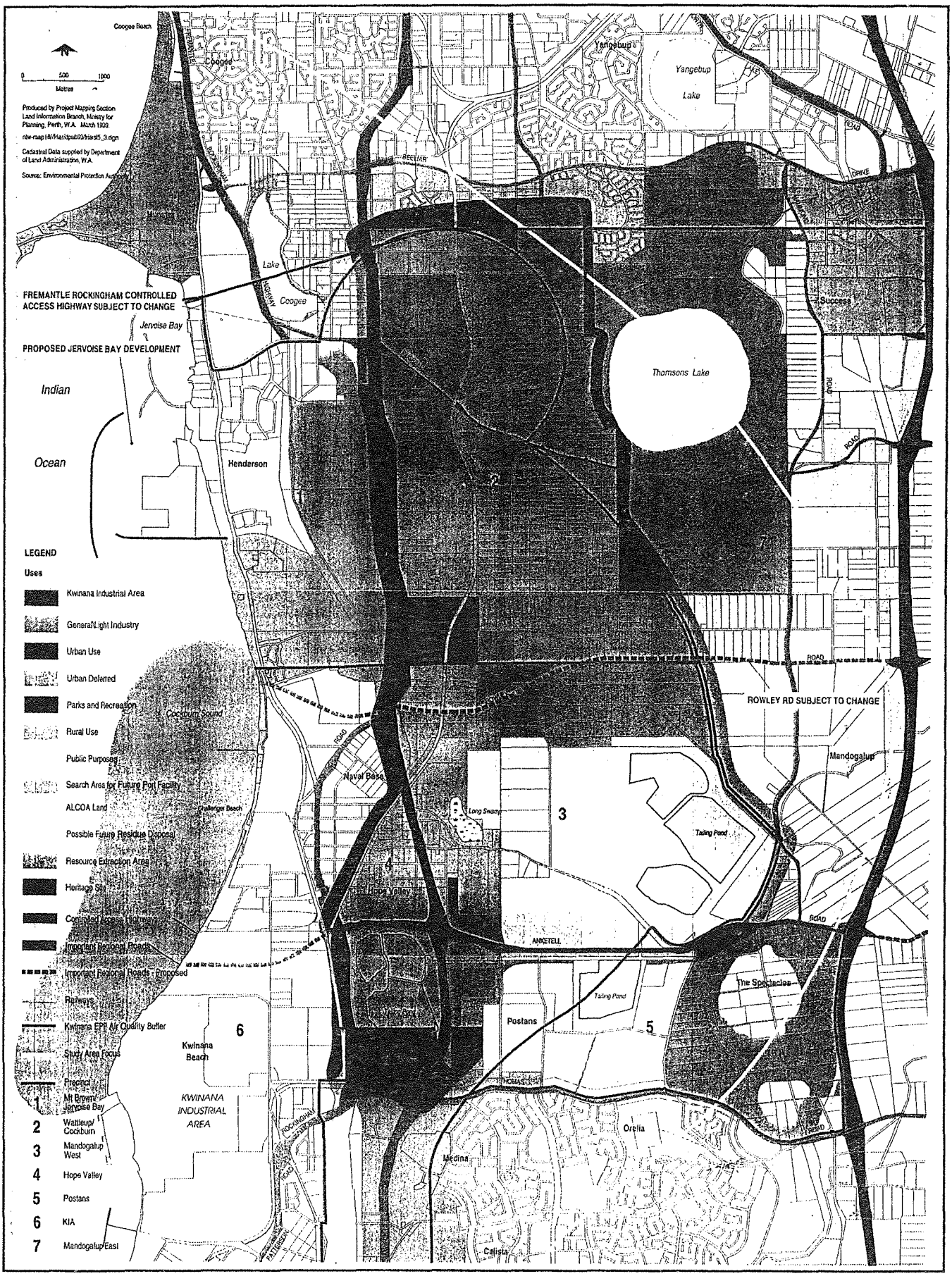

Figure 1. Option 1. Status Quo (Source: Fremantle-Rockingham Industrial Area Regional Strategy, (WAPC, 1999)).

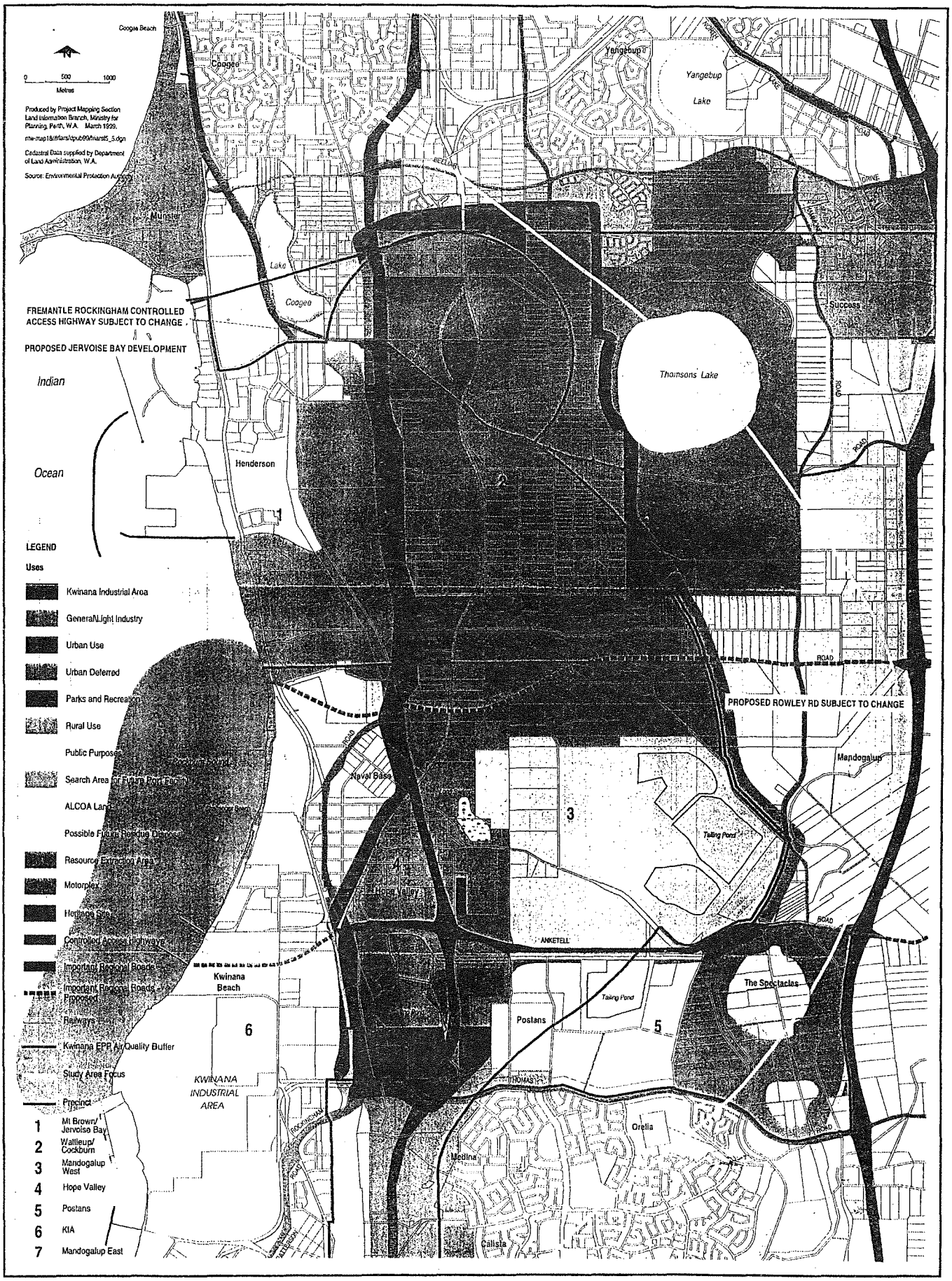

Figure 2. Option 2. Mixed-use development (Source: Fremantle-Rockingham Industrial Area Regional Strategy, (WAPC, 1999)).

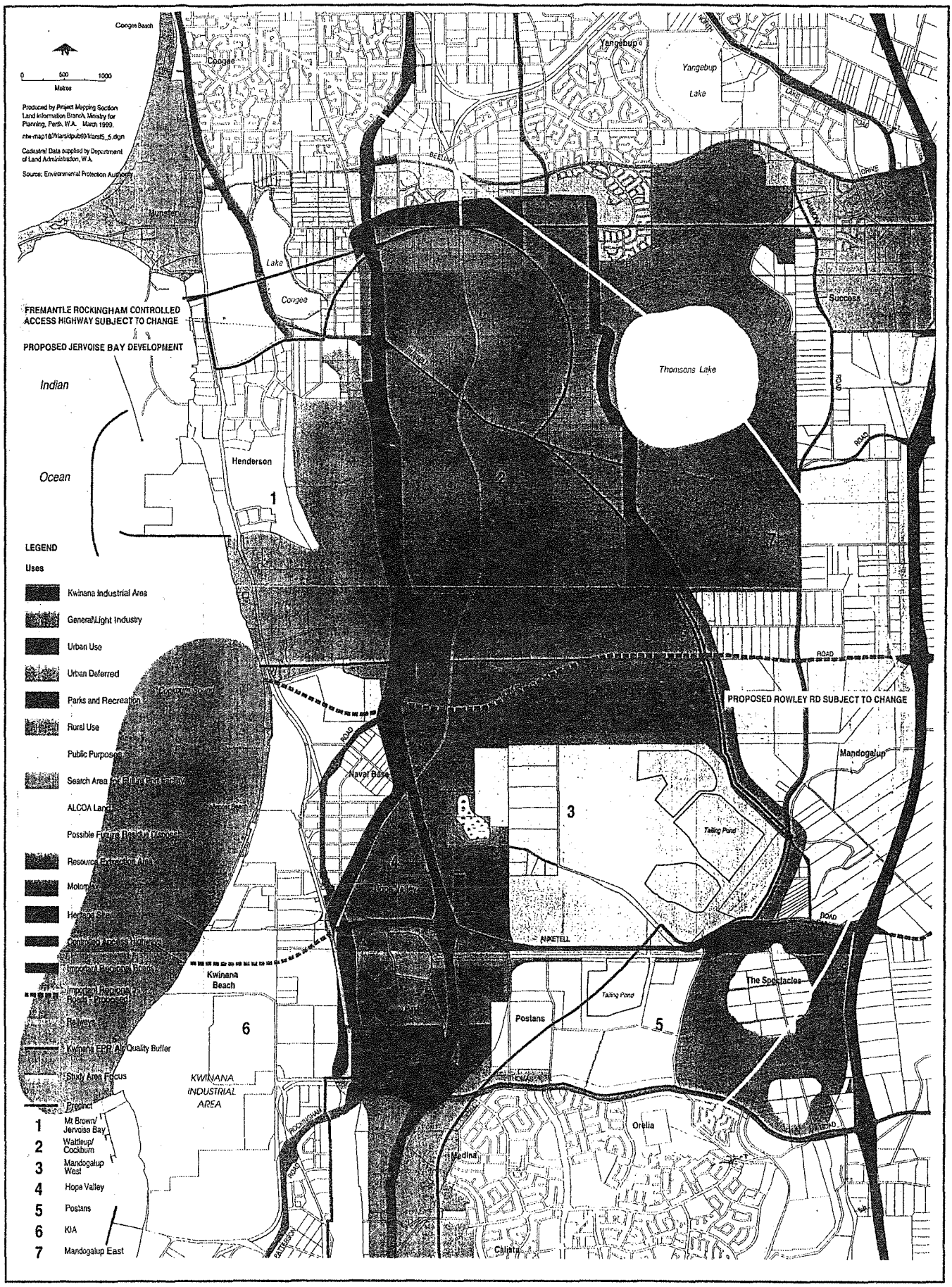

Figure 3. Option 3a. General industrial use (Source: Fremantle-Rockingham Industrial Area Regional Strategy, (WAPC, 1999)).

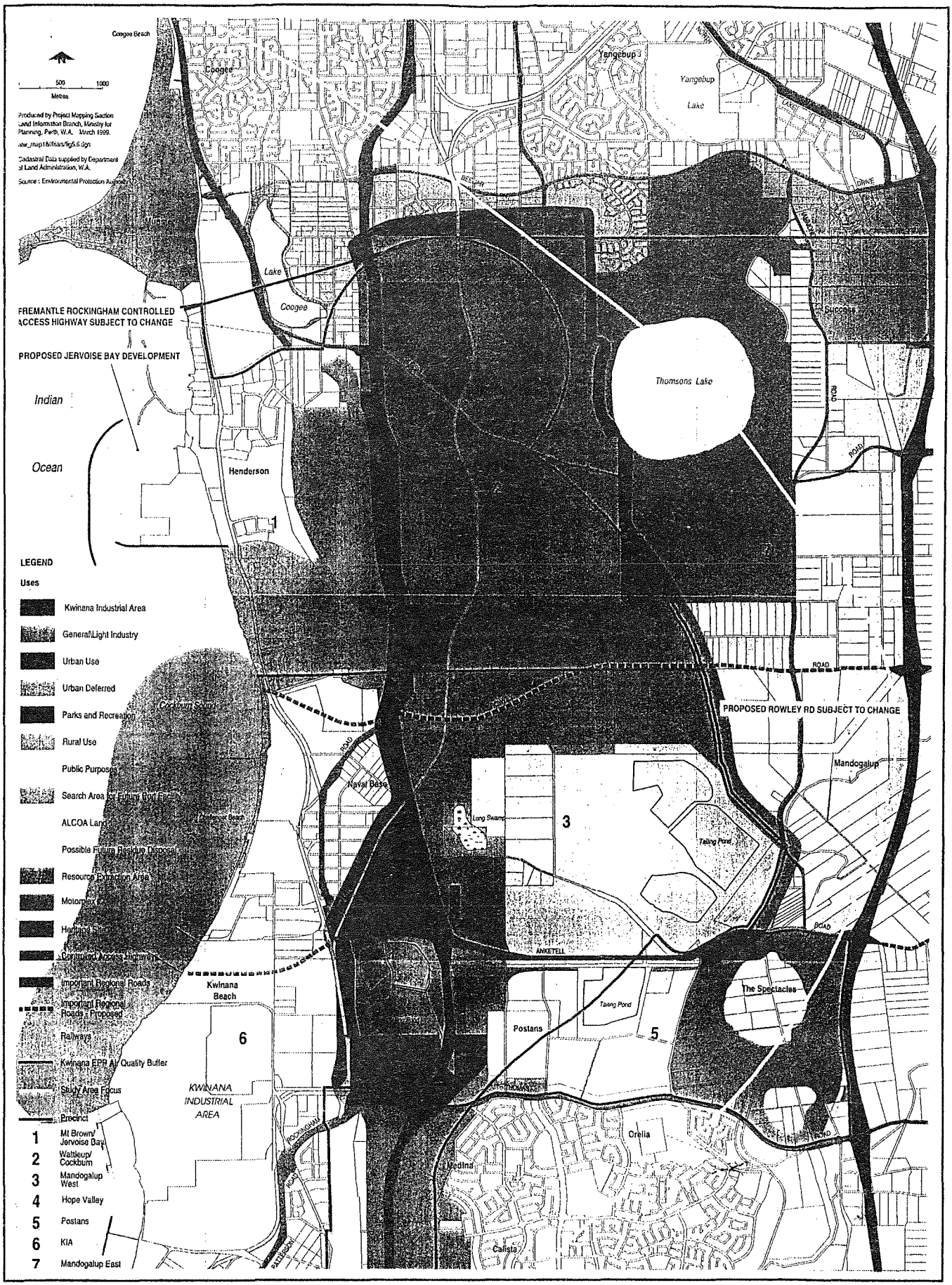

Figure 4. Option 3b. General industrial use (Source: Fremantle-Rockingham Industrial Area Regional Strategy, (WAPC, 1999)).

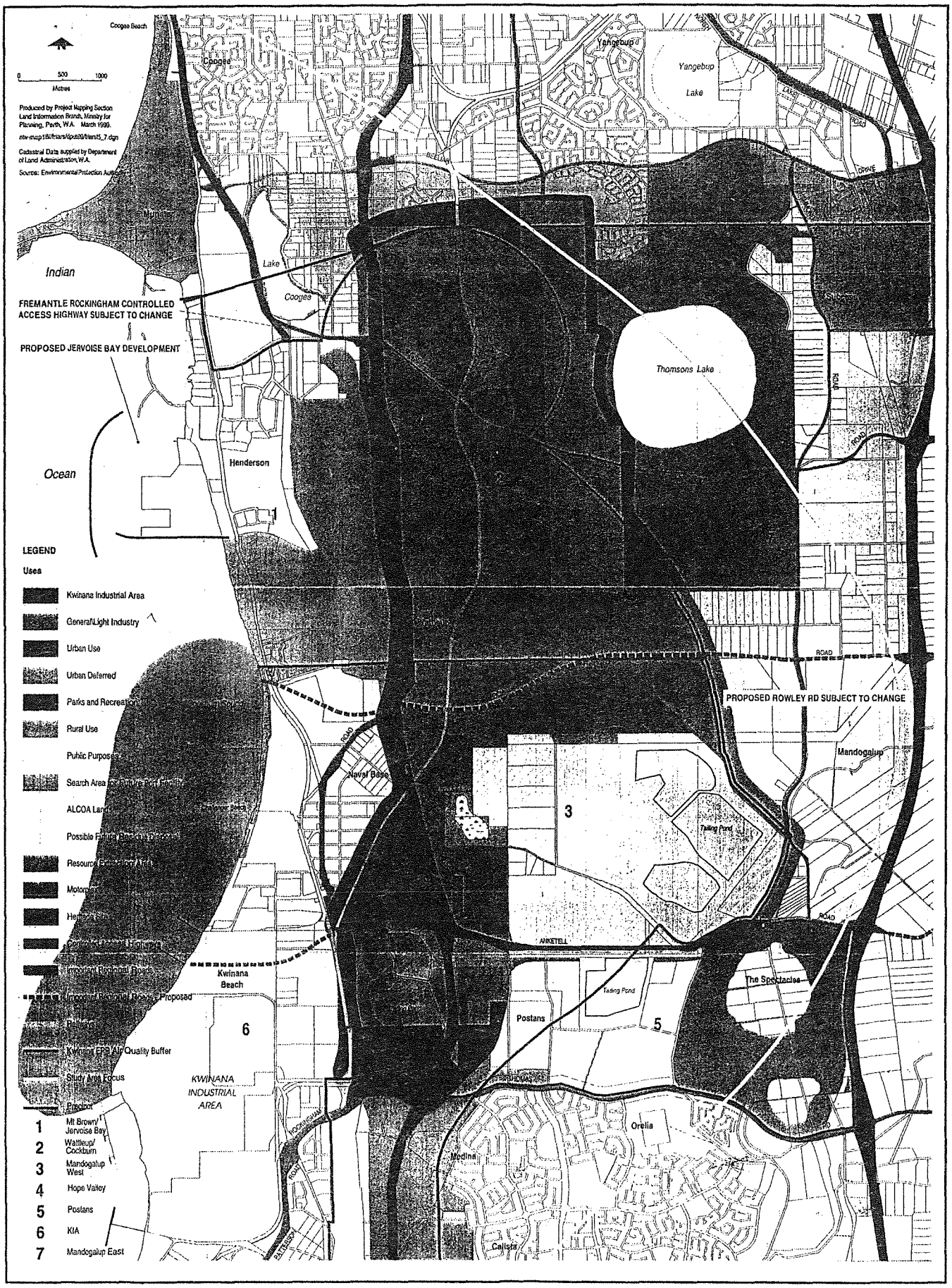

Figure 5. Option 4. General industrial use (Source: Fremantle-Rockingham Industrial Area Regional Strategy, (WAPC, 1999)).

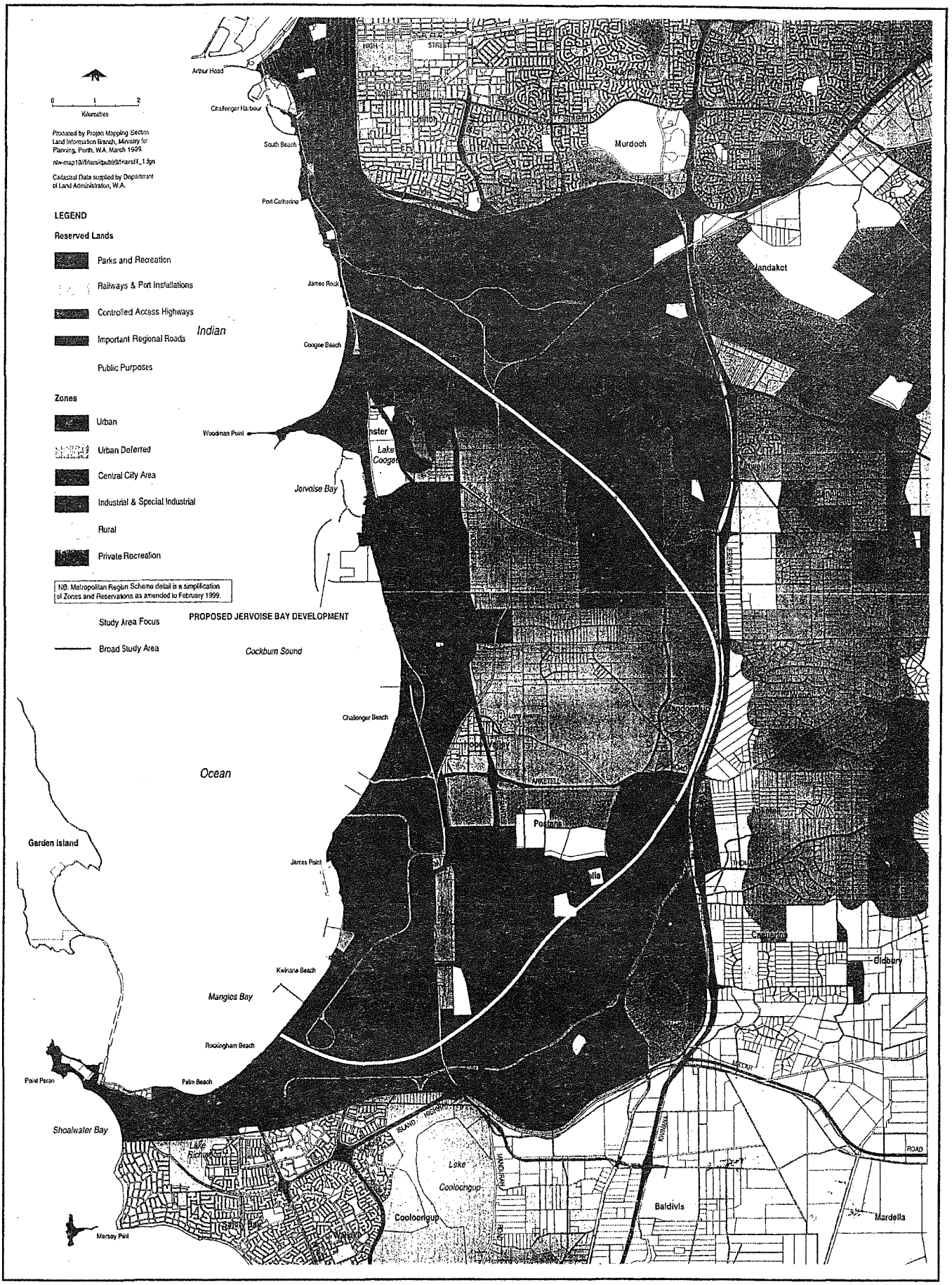

Figure 6. Locality plan and study area boundary (Source: Fremantle-Rockingham Industrial Area Regional Strategy, (WAPC, 1999)).

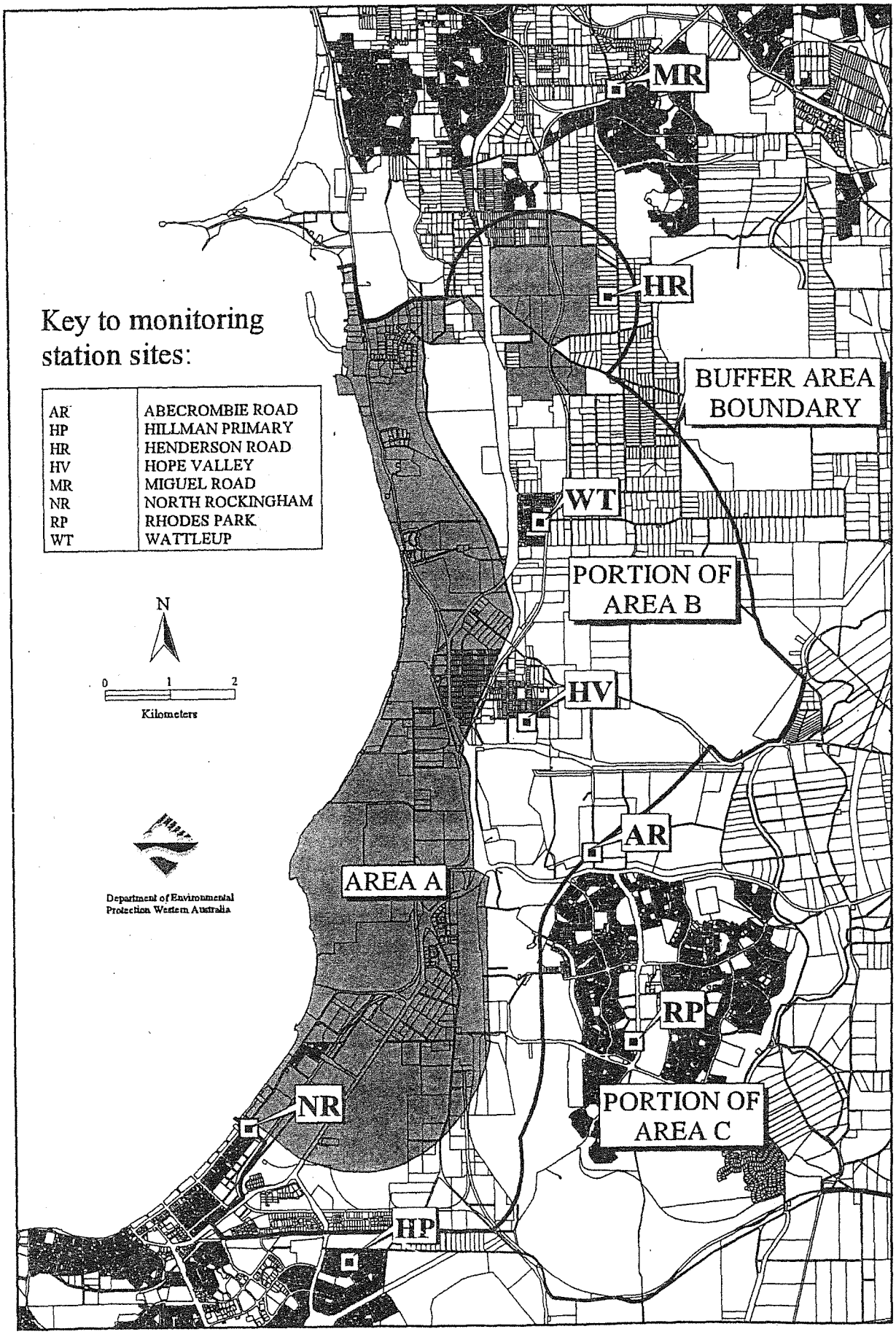

Figure 7. Kwinana Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1992.

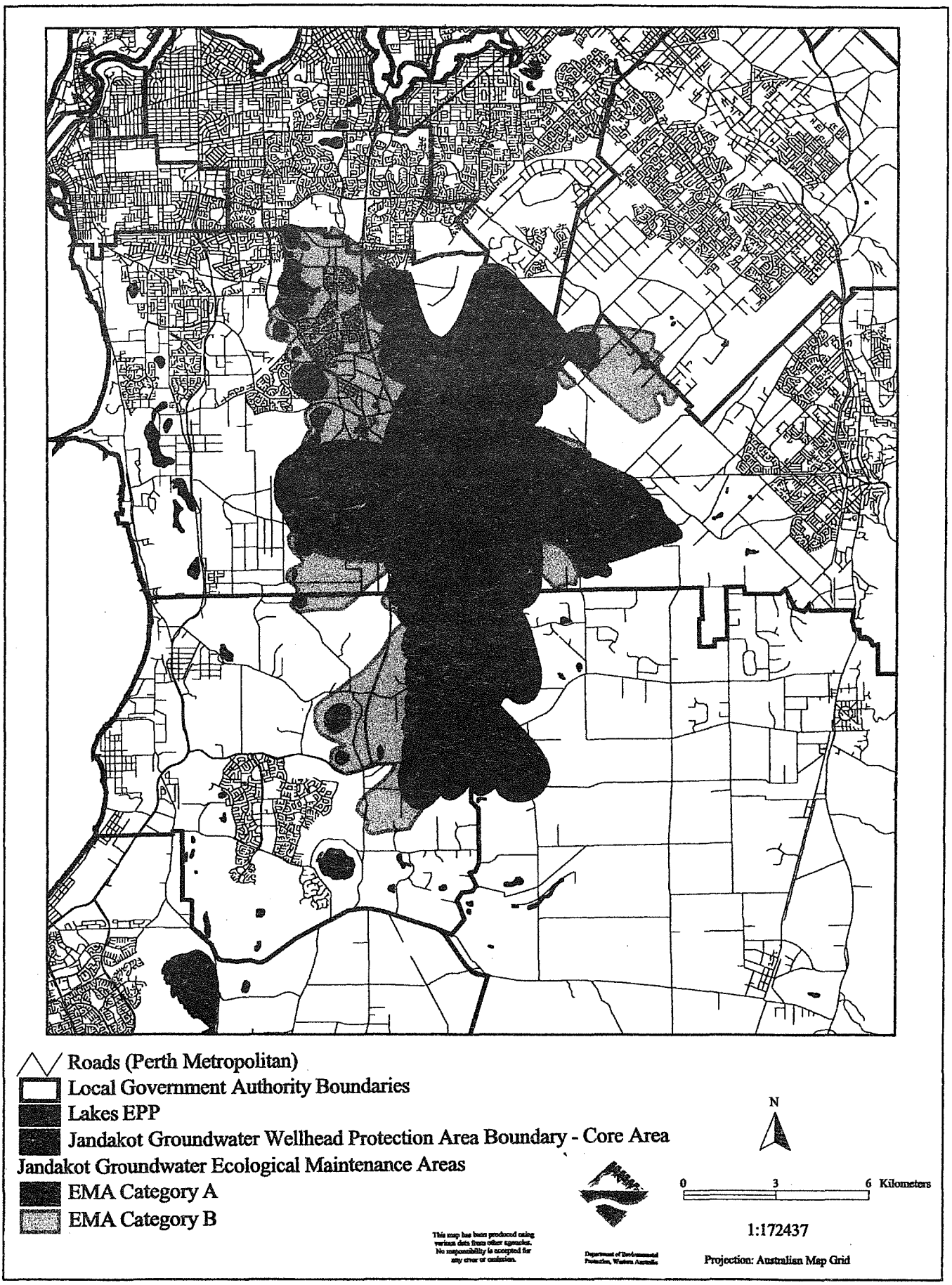

Figure 8. Jandakot Mound Environmental Management Areas.

Appendix 2

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