



**HOPE VALLEY  
WATTLEUP**

redevelopment project

**ENVIRONMENTAL REVIEW**

(EPA Assessment Number 1470)

Western Australian Land Authority  
(LandCorp)

5 December 2003

## Invitation to make a submission

The Western Australian Land Authority (LandCorp) has prepared the Hope Valley-Wattleup Redevelopment Project Master Plan in accordance with the *Hope Valley-Wattleup Redevelopment Act 2000*. LandCorp invites people to make a submission on the environmental issues associated with the Proposed Master Plan.

In accordance with the Section 48 (c)(1)(a) *Environmental Protection Act 1986*, an Environmental Review (ER) has been prepared which describes the Hope Valley-Wattleup Redevelopment Project Proposed Master Plan and its likely effects on the environment. The ER is available for a public review period of 13 weeks from 5 December, 2003 closing on 4 March, 2004.

Submissions on environmental issues will be forwarded by LandCorp to the Environmental Protection Authority (EPA), and will help the EPA to prepare an assessment report in which it will make recommendations to Government.

### **Why write a submission?**

A submission is a way to provide information, express your opinion and put forward your suggested course of action - including any alternative approach. It is useful if you indicate any suggestions you may have to improve the proposal.

All submissions received by the EPA will be acknowledged. Submissions will be treated as public documents unless provided and received in confidence subject to the requirements of the *Freedom of Information Act 1992*, and may be quoted in full or in part in the EPA's report.

### **Why not join a group?**

If you prefer not to write your own comments, it may be worthwhile joining with a group interested in making a submission on similar issues. Joint submissions may help to reduce the workload for an individual or group, as well as increase the pool of ideas and information. If you form a small group (up to 10 people) please indicate all the names of the participants. If your group is larger, please indicate how many people your submission represents.

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## Developing a submission

You may agree or disagree with, or comment on, the general issues discussed in the ER or the specific proposals. It helps if you give reasons for your conclusions, supported by relevant data. You may make an important contribution by suggesting ways to make the proposal more environmentally acceptable.

When making comments on specific elements of the ER:

- clearly state your point of view;
- indicate the source of your information or argument if this is applicable;
- suggest recommendations, safeguards or alternatives.

## Points to keep in mind

By keeping the following points in mind, you will make it easier for your submission to be analysed:

- attempt to list points so that issues raised are clear. A summary of your submission is helpful;
- refer each point to the appropriate section, chapter or recommendation in the ER;
- if you discuss different sections of the ER, keep them distinct and separate, so there is no confusion as to which section you are considering;
- attach any factual information you may wish to provide and give details of the source. Make sure your information is accurate.

Remember to include: your name; address; date; and whether you want your submission to be confidential. The closing date for submissions is by 5pm 4 March 2004.

Submissions should preferably be emailed to: [submissionENV@hvwrp.com.au](mailto:submissionENV@hvwrp.com.au)

Submissions may also be posted to:

Hope Valley-Wattleup Redevelopment Project Office  
PO Box 303  
KWINANA WA 6966  
Attention: Project Officer

If you have any questions on the ER or aspects of the proposal please contact the Hope Valley-Wattleup Redevelopment Project Office on 9437 2155. If you have any questions on the EPA's process, please ring the EPA Project Officer, Maxine Dawson, on (08) 9222 7049.

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## EXECUTIVE SUMMARY

### Introduction

The Western Australian Land Authority (LandCorp) has prepared the Hope Valley-Wattleup Redevelopment Project Proposed Master Plan (the Proposed Master Plan) in accordance with *Hope Valley-Wattleup Redevelopment Act 2000* ('the Act'). The Proposed Master Plan involves the development and redevelopment of approximately 1,426 hectares of land in the local government areas of Cockburn and Kwinana.

### The Proposal

The Proposed Master Plan provides a long-term framework for the development of a regional industrial location of strategic importance. The Proposed Master Plan will provide the basis for development control within the project area, and will be administered by the Western Australian Planning Commission (WAPC).

The Proposed Master Plan sets out the planning framework for the redevelopment, which includes:

- The Planning Strategy;
- Planning Policies and Design Guidelines;
- Dividing the Redevelopment Area into precincts to identify areas for particular uses;
- Identifying land reserved for public purposes;
- Controlling the types of uses and development allowed in different precincts;
- General controls for protection of the environment and heritage; and
- Requirements for structure plans and planning approvals.

In summary, the Proposed Master Plan depicts general and transport-related industry in the Hope Valley area, general industrial development between Long Swamp and the future extension of Rowley Road, transport-related uses around the Wattleup town-site, and predominantly general industrial development in the northern part of the Redevelopment Area. At the eastern and northern entrances to the Redevelopment Area, the proposed use of land is for eco-industrial and commercial office uses.

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Other initiatives within the area will include commercial land uses over the Wattleup townsite, and resource recovery over and around the existing waste facilities north of Wattleup townsite. Long Swamp and Conway Road Swamp will be retained for parks and recreation and conservation purposes. An east-west linkage of upland vegetation from Conway Road Swamp east to the proposed Fremantle-Rockingham Highway road reserve will also be retained for parks and recreation and conservation purposes.

An east-west vegetated linkage extending from the proposed Fremantle-Rockingham Highway road reserve to the Hendy Road Swamps, with a vegetated north-south linkage to Long Swamp, as well as other potential significant “green links” and additional areas of remnant vegetation, have also been identified as having potential for conservation. This potential will be considered at the precinct planning stage subject to further environmental investigations.

### Proposal Justification

The *Fremantle-Rockingham Industrial Area Regional Strategy* (FRIARS) identified the Fremantle–Rockingham region, focusing on the Hope Valley-Wattleup area, as the best location for the future development of industrial land within the Perth Metropolitan Region and “*arguably*” the State. This judgment was based on long-term advantages of the area, including integration with existing industry, infrastructure accessibility, and strong inter-regional links. These attributes give the area a strategic advantage as a future industrial and employment location over alternative locations. Additionally and equally as important, the qualities apply to a location that can provide a longer-term solution, that is, the establishment of a larger, integral industrial area compared with piecemeal, small-area initiatives.

#### The Proposed Master Plan:

- Provides the basis for initiating land use change in the Kwinana air quality EPP buffer, removing the potential for future land use conflicts within the buffer area, and taking account of adjoining land uses;
- Will protect, consolidate and support the Kwinana Industrial Area (KIA) through the development of appropriate industrial and related uses between the KIA and adjacent areas;

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- Will provide for a diversity of mutually advantageous industrial land uses in a regional setting containing similar uses, meeting demand in a location where existing infrastructure can be upgraded efficiently;
- Will provide significant employment opportunities over time, within the developing South-West Corridor and adjoining regions; and
- Will require the progressive removal of uses inappropriate to the intended development of the location for industrial purposes, most notably residential land use.

## Environmental Review

This Environmental Review (ER) describes the existing environment and the potential environmental impacts resulting from the implementation of the Proposed Master Plan, together with a description of management strategies proposed within subsequent planning processes.

The following relevant environmental factors have been addressed in this ER:

- Sustainability
- Land Use Compatibility
- Catchment Management
- Flora
- Fauna
- Wetlands
- Surface water and Groundwater
- Conservation Areas
- Air Quality
- Water Quality
- Soil Quality
- Noise
- Other Potential Pollutants
- Risk

For each factor, the EPA instructions are provided in terms of objectives and scope of work, followed by a description of the existing environment and relevant

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environmental policies, potential impacts, proposed management strategies, and subsequent environmental outcomes.

A summary of the EPA's objectives, potential impacts and proposed environmental management for each factor is contained in Table A.

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**TABLE A: SUMMARY TABLE OF ENVIRONMENTAL IMPACTS AND MANAGEMENT**

Factor	Preliminary EPA Objectives	Potential Impacts	Environmental Management
<b>Sustainability</b>	To ensure as far as practicable, that the proposal meets or is consistent with the sustainability principles in the <i>National Strategy for Ecologically Sustainable Development</i> (Commonwealth of Australia, 1992).	<p>Initial sustainability assessment and evaluation of the existing HVWRA shows that its sustainability performance has significant potential for improvement.</p> <p>The assessment of the HVWRP Indicative Land Use Plan (Proposed Master Plan) results in a much higher score of potential sustainability success, with clear improvements in the majority of the sectors. Some sectors have the potential for larger improvements than others, with certain quadrants (e.g. Economic) clearly showing the benefits that will be derived by redeveloping the HVWRP.</p>	<p>Comprehensive management through:</p> <p>Proposed Master Plan Text Provisions 1.7 and 7.2.</p> <p>Planning Strategy – Social and Environmental Objectives</p> <p>Planning Policy 1.2</p>
<b>Land use compatibility</b>	To ensure that the health, welfare and amenity of people and land uses are not adversely affected by emissions and risk generated by neighbouring land uses.	Industry and associated infrastructure have potential to generate a range of emissions including noise, air emissions (gases and odours), light-spill and public risk. The levels of emissions can at times exceed levels considered acceptable to sensitive land uses such as residential areas.	<p>Comprehensive management through:</p> <p>Proposed Master Plan Text Provisions 7.1, 7.3.6 and 7.4.2</p> <p>Proposed Master Plan Report Planning Strategy C2.4.3 - Environmental Strategy</p> <p>Social Transition Strategy</p>
<b>Catchment management</b>	To ensure that emissions will not adversely impact on the integrity, ecological functions and environmental values of Cockburn Sound, and are conducive to the improvement of the water quality of the Sound.	<p>The primary threat to water quality in Cockburn Sound is the effect of nutrient enrichment. Nutrients and other pollutants potentially arising from the implementation of the Proposed Master Plan could potentially reach Cockburn Sound via groundwater, and to a lesser degree by surface water drainage.</p> <p>The HVWRP will result in the transition from horticultural activities, extractive industries, landfills and other potentially groundwater contaminating land uses to commercial/industrial land uses. It is expected that the transition from horticultural and residential land uses will result in a large decline in the contaminant load entering the groundwater. However, if not adequately planned and managed, the change to industrial land use may increase the risk of contamination resulting from chemical or effluent spillages and leakages.</p>	<p>Comprehensive management through:</p> <p>Proposed Master Plan Text Provisions 7.1, 7.2 and 7.3.2</p> <p>Proposed Planning Policy – Water Management Strategy</p> <p>Planning Strategy – Groundwater and Cockburn Sound Provisions</p>



Factor	Preliminary EPA Objectives	Potential Impacts	Environmental Management
<b>Flora</b>	To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	Currently there is approximately 260ha of remnant vegetation within the Redevelopment Area. Approximately 41.75ha is proposed for Parks and Recreation reservation and conservation of which 33.43ha is remnant vegetation. As a worst case scenario, approximately 227ha is potentially impacted by future land use, however large proportions of this remnant vegetation will be retained and managed following more detailed surveys at the precinct planning and development application level.	Comprehensive management through: Proposed Master Plan Text Provisions 7.1, 7.2, 7.4.1, 7.4.2 Proposed Master Plan Report Planning Strategy – C2.4.3 Environmental Strategy Planning Policy 1.3 – Landscaping
<b>Fauna</b>	To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.	<p><i>Predominant impacts to fauna as a result of proposed land uses in the project area are directly related to impacts on vegetation as described above, and include removal of existing vegetation remnants and hence habitat:</i></p> <ul style="list-style-type: none"> <li>removal of vegetation within remnants in Precincts 9, 10, 11 and 12 along Russell Road which may impact on the potential east-west linkage between Thomsons Lake and Brownman Swamp;</li> <li>removal of vegetation within remnants in Precincts 4 and 6 and a portion of vegetation in Precincts 3 and 5 which may form part of an ecological east-west corridor within the proposed Rowley Road extension;</li> <li>removal of other varying sized pockets of remnant vegetation in Precincts 2, 3, 4, 7, 8, 10, 11 and 12; and</li> <li>Removal of vegetation in Precinct 1 which act as ecological linkages between Long Swamp, Hendy Road Swamps and Conway Road Swamp.</li> </ul> <p>Impacts to protected fauna expected to exist within the project area (Quenda) include potential development within the proposed buffer of the Resource Enhancement wetland at the eastern end of Precinct 1, and the wetlands beyond the eastern extent of Precinct 13.</p>	Comprehensive management through: Proposed Master Plan Text Provisions 7.1, 7.2, 7.4.1, 7.4.2 Proposed Master Plan Report Planning Strategy C2.4.3 – Environmental Strategy

Factor	Preliminary EPA Objectives	Potential Impacts	Environmental Management
<b>Wetlands</b>	To maintain the integrity, ecological functions and environmental values of wetlands.	<p><i>The Proposed Master Plan proposes to conserve all of the wetlands within the Redevelopment Area and consequently direct impacts such as clearing, draining or filling will not occur. Potential impacts will therefore be limited to those associated with indirect actions, which may include:</i></p> <ul style="list-style-type: none"> <li>• Increased use of the wetlands by residents and visitors as passive recreation areas;</li> <li>• Pressure on wetland vegetation through uncontrolled access;</li> <li>• Invasion of weeds and possibly diseases through the disturbance of natural habitats;</li> <li>• Changes in hydrology and pollutant loading; and</li> <li>• Increased potential for fire as a result of adjoining development.</li> </ul>	<p>Comprehensive management through:</p> <p>Proposed Master Plan Text Provisions 7.1, 7.2, 7.3.3</p> <p>Proposed Master Plan Report Planning Strategy C2.4.3 – Environmental Strategy</p>
<b>Water-Surface water and groundwater</b>	To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected.	<p><i>Potential impacts to surface water and groundwater quantities within the project area are:</i></p> <ul style="list-style-type: none"> <li>• Decreases of water levels and effects on wetlands (including the Conservation management category Long Swamp) as result of groundwater drawdown and through over-abstraction;</li> <li>• Increases in wetland water levels as a result of surface water or stormwater discharge;</li> <li>• Increases in stormwater runoff generated as a result of development within the project area; and</li> <li>• Potential increases in groundwater abstraction required for industrial contamination recovery.</li> </ul>	<p>Comprehensive management through:</p> <p>Proposed Master Plan Text Provisions 7.1, 7.2, 7.3.2</p> <p>Planning Strategy</p> <p>Proposed Planning Policy – Water Management Strategy</p> <p>Planning Policy 1.3 – Landscaping</p>
<b>Conservation areas</b>	To protect the environmental values of areas identified as having significant environmental attributes.	<p><i>Potential impacts to conservation areas both within and external to the project area include:</i></p> <ul style="list-style-type: none"> <li>• Impacts to wetlands within both the project area and possibly the Beeliar Regional Park as a result of pollution, or variations in groundwater and surface water quality and quantity;</li> <li>• Impacts to <i>Bush Forever</i> Sites adjacent and in proximity to the project area; and</li> <li>• Clearing of pivotal vegetation associated with ecological links within the project area and linking to Beeliar Regional Park.</li> </ul>	<p>Comprehensive management through:</p> <p>Proposed Master Plan Text Provisions 7.1, 7.2, 7.3.3, 7.4.1, 7.4.2</p> <p>Proposed Master Plan Report Planning Strategy C2.4.3 – Environmental Strategy</p>



Factor	Preliminary EPA Objectives	Potential Impacts	Environmental Management
<b>Air quality</b>	To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.	<p>The KIA lies to the south of the HVWRA. The industries within the KIA produce a range of emissions including particulates, sulphur dioxide, odour, etc.</p> <p><i>The currently active Alcoa Residue Storage Area is located immediately to the south-east of the HVWRA. This can cause dust, and possibly odour, emissions which have the potential to affect surrounding land uses.</i></p> <p>The Kwinana Motorplex which lies immediately south of the HVWRA may contribute localised fuel vapour and vehicle combustion emissions.</p> <p>There is a range of existing land uses and their associated emissions within the HVWRA that may cause air impacts within and external to the HVWRA. The key sites are (WAPC, 2002):</p> <ul style="list-style-type: none"> <li>• Cockburn Cement</li> <li>• Basic Raw Material Areas:</li> <li>• Henderson landfill</li> </ul> <p><i>In addition there are a range of potential emissions and impacts associated with the proposed land uses within the HVWRA.</i></p>	<p>Comprehensive management through:</p> <p>Proposed Master Plan Text Provisions 1.7, 7.1, 7.2, 7.3.4, 7.4.2</p> <p>Planning Strategy</p> <p>Planning Policy 1.2 – Energy Conservation</p>
<b>Water quality</b>	To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.	Refer to Section 4.3 Catchment Management and Water Quality	Refer to Section 4.3 Catchment Management and Water Quality



Factor	Preliminary EPA Objectives	Potential Impacts	Environmental Management
<b>Soil quality</b>	To ensure that rehabilitation achieves an acceptable standard compatible with the intended land use, and consistent with appropriate criteria.	<p>By today's public health and environmental standards, soil and groundwater within the HVWRA may have been impaired by historical activities. Redevelopment of the HVWRA as proposed will see the reduction and removal of many potentially contaminating activities and land uses. Reduced horticultural activity together with the removal of unsewered premises will substantially reduce level of nutrients, trace metals and pesticides entering soils and groundwater.</p> <p><i>Industrial land uses create the potential for contamination to occur through the use, storage and transport of raw materials, process chemicals and manufacturing waste.</i></p>	<p>Comprehensive management through:</p> <p>Proposed Master Plan Text Provisions 1.7, 7.1, 7.2, 7.3.1, 7.4.1, 7.4.2</p> <p>Planning Strategy</p>
<b>Noise</b>	To protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring the noise levels meet statutory requirements and acceptable standards.	<p><i>There are a number of existing sources of noise within or in proximity to the HVWRA:</i></p> <ul style="list-style-type: none"> <li>- Kwinana Motorplex;</li> <li>- Kwinana Industrial Area;</li> <li>- A freight railway line extends in a north – south direction through the HVWRA</li> <li>- Perth – Bunbury Highway (Rockingham Road) runs along the majority of the western border of the HVWRA;</li> <li>- Cockburn Cement; and</li> <li>- the Henderson landfill.</li> <li>-</li> </ul> <p>Intermittent noise is also experienced within the HVWRA as a result of existing road and freight railway networks. The proposal has the potential to increase noise emitted from the railway and from heavy trucks on designated freight routes due to increased use associated with industrial development.</p> <p><i>In addition there are potential noise impacts associated with the proposed land uses within the HVWRA.</i></p>	<p>Comprehensive management through:</p> <p>Proposed Master Plan Text Provisions 7.1, 7.2, 7.3.5</p> <p>Planning Strategy</p>

Factor	Preliminary EPA Objectives	Potential Impacts	Environmental Management
<b>Other potential pollutants</b>	To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.	During construction of the development there are potential dust impacts to nearby residents. Some future industries may have light overspill or radiation impacts associated with the uses.	Comprehensive management through: Proposed Master Plan Provisions 7.1, 7.3.6, 7.4.1, and 7.4.2 Proposed Master Plan Report Planning Strategy C2.4.3 - Environmental Strategy Social Transition Strategy
<b>Risk</b>	To ensure that risk from the proposal is as low as reasonably achievable and complies with acceptable standards and EPA criteria.	Primarily, the societal risk in the area is generated by industry within the Kwinana Industrial Area. Potential risk in the HVWRA is also associated with: <ul style="list-style-type: none"> <li>- high- medium voltage transmission lines</li> <li>- Alinta, CMS Energy and Epic Energy high-pressure gas pipelines;</li> <li>- Three oil pipelines;</li> <li>- Henderson landfill;</li> <li>- Cockburn Cement;</li> <li>- high numbers of patrons intermittently at Motorplex;</li> <li>- existing and proposed transport and freight routes.</li> </ul>	Comprehensive management through: Proposed Master Plan Provisions 7.2, 7.3.6 Planning Strategy

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Acronyms used in this report:

CCI	Chamber of Commerce and Industry
CSMC	Cockburn Sound Management Council
DCLM (CALM)	Department of Conservation and Land Management
DEP	Department of Environmental Protection
DoE	Department of Environment (formerly Department of Environmental Protection and Water and Rivers Commission)
DoIR	Department of Industry and Resources (formerly Department of Industry and Technology)
DIT	Department of Industry and Technology (formerly Department of Commerce and Trade)
DMPR	Department of Minerals and Petroleum Resources (formerly Department of Resources Development DRD)
DLI	Department of Land Information
DPI	Department for Planning & Infrastructure
EPA	Environmental Protection Authority
EPP	Environmental Protection Policy
ER	Environmental Review
FPA	Fremantle Port Authority
FRIARS	Fremantle-Rockingham Industrial Area Regional Strategy
HVWER	Hope Valley-Wattleup Environmental Review
HVWRA	Hope Valley-Wattleup Redevelopment Area
HVWRP	Hope Valley-Wattleup Redevelopment Project
HVWRPPMP	Hope Valley-Wattleup Redevelopment Project Proposed Master Plan
IFR	Individual Fatality Risk
KIA	Kwinana Industrial Area
KIC	Kwinana Industry Council
Kwinana EPP	Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999
LandCorp	Western Australian Land Authority
MRWA	Main Roads Western Australia
NEPM	<i>National Environment Protection Measures (Implementation Act) 1998</i>
SPP	Statement of Planning Policy
SWMR	South West Metropolitan Railway
SWOT	Strengths, Weaknesses, Opportunities and Threats
WAPC	Western Australian Planning Commission
WCMG	Wattleup Community Management Group (representing Wattleup Township)

Terms used in this report:

Brownfield	A brownfield refers to land that has previously been developed and is subject to redevelopment. The terms often, but not always, infer a level of contamination from the existing development that must be remediated prior to new development taking place. A brownfield is opposite to a greenfield development, which occurs on virgin land.
Industrial Ecology	Industrial ecology is a concept that relates industrial process cycles to biological cycles. The term has been used to describe “closed loop” industrial processes where waste generated from industry is reabsorbed back into industry rather than being dumped.
New Economy	The “New Economy” refers to the emerging economic system that has developed from the industrial mode of development to the informational mode of development and its subsequent affect on globalisation. An economy that is networked globally and operates as a unit in real time.
Sustainable Development	The definition of “Sustainable Development” adopted by the project team is that given (and most commonly adopted) by the Brundtland Report to the United Nations in 1987 which states – Sustainable development is development that meets the needs of today without compromising the ability of future generations to meet their own needs.
Eco-Industry	An industry which has as its primary organising principle the achievement of positive environmental outcomes.



## 1.0 INTRODUCTION

The Western Australian Land Authority (LandCorp) has prepared the Hope Valley-Wattleup Redevelopment Project Proposed Master Plan in accordance with *Hope Valley-Wattleup Redevelopment Act 2000* ('the Act').

The Hope Valley-Wattleup Redevelopment Project Proposed Master Plan (the Proposed Master Plan) involves the development and redevelopment of approximately 1,426 hectares of land in the local government areas of Cockburn and Kwinana (Figure 1). Figure 2 provides aerial photography of the Proposed Master Plan area, with Thomsons Lake visible in the east, and Brownman Swamp and Lake Mt Brown within the Beeliar Regional Park west of Rockingham Road.

The Proposed Master Plan was referred to the Environmental Protection Authority by LandCorp in February 2003 in accordance with Section 18 of the *Hope Valley-Wattleup Redevelopment Act 2000*.

The EPA set level of assessment at "Assessed: Environmental Review Required" in May 2003. Instructions for the preparation of the Environmental Review (ER) were subsequently released by the EPA (Appendix A), and this document has been prepared to satisfy and address these instructions.

### 1.1 Background

A regional planning study known as the *Fremantle-Rockingham Industrial Area Regional Strategy* (FRIARS) was completed by the Western Australian Planning Commission (WAPC) in 1999. The predominant aims of FRIARS were to:

- Maintain Kwinana as the State's premier heavy industrial estate;
- Identify additional general industrial land within the Fremantle – Rockingham region;
- Maximise employment benefits to the region arising from any change;

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- Resolve current land use conflicts between residential and industrial use of land;
- Provide for improvements to the transport network in the region, catering for general and specific growth likely to be associated with current and future industrial activity and port facilities; and
- Protect the environmental and heritage sites of significance in the area (WAPC, 2000).

The strategy identified the Fremantle – Rockingham region, with a focus on the Hope Valley-Wattleup area, as the best location for the future development of industrial land within the Perth Metropolitan region, and “*arguably*” the State. It also recommended that specific legislation be prepared to facilitate development of the preferred land use strategy for the area. This legislation was subsequently prepared and gazetted as the *Hope Valley-Wattleup Redevelopment Act 2000*.

The Act requires the preparation and implementation of a Master Plan for the area by LandCorp, with the WAPC as the administrator.

The master planning for the Hope Valley-Wattleup Redevelopment Project (HVWRP) commenced in September 2001, and followed the process outlined below:

- Project Vision and Objectives (September 2001 – October 2001)
- SWOT Analysis (September 2001 – April 2002)
- Future Land Use Plan Design (May 2002 – October 2002)
- Proposed Master Plan (July 2002 – November 2003)
- Proposed Master Plan Report (October 2002 – November 2003)

This process resulted in the determination of a preferred land use option, formed the basis of the Proposed Master Plan. The Proposed Master Plan is the first strategic level of planning which will guide the outcomes of the proposed redevelopment, and divides the project area into development precincts. This will be followed by more specific future structure planning in each precinct, based on the overarching principles determined in the Proposed Master Plan and this Environmental Review. This process is more fully described in Section 1.3.

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## 1.2 The Proposed Master Plan in Brief

### Planning Framework

Under the Act, the Western Australian Land Authority (LandCorp) is empowered to plan, undertake, promote and co-ordinate the development and redevelopment of land in the redevelopment area. The Proposed Master Plan forms part of this initial responsibility by LandCorp and provides the framework and guidelines for future development of the area.

The Proposed Master Plan will provide the basis for development control within the project area, and will be administered by the WAPC. The Proposed Master Plan is based on the WAPC's *Model Scheme Text* (MST) and was prepared by LandCorp collaboratively with the:

- Department for Planning and Infrastructure (DPI);
- Environmental Protection Authority Service Unit (EPASU);
- Department of Mineral and Petroleum Resources (DMPR);
- Department of Industry and Resources (DoIR);
- City of Cockburn; and
- Town of Kwinana.

The Proposed Master Plan sets out the planning framework for the redevelopment, which includes:

- The Planning Strategy;
- Planning Policies and Design Guidelines;
- Dividing the Redevelopment Area into precincts to identify areas for particular uses;
- Identifying land reserved for public purposes;
- Controlling the types of uses and development allowed in different precincts;
- General controls for protection of the environment and heritage;
- Requirements for structure plans and planning approvals.

The Proposed Master Plan Report supports the Proposed Master Plan by providing the planning rationale and explaining how the plan for land use will meet the overall project objectives. Objectives focus on the key issues of:

- Land Use

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- Social
- Environment
- Transport
- Infrastructure

As a precursor to the Proposed Master Plan the WAPC requires the preparation of a planning strategy. The planning strategy sets out the long-term direction for land use planning and development control for the redevelopment area. The strategy is contained within the Proposed Master Plan Report (Section C2).

### Proposed Land Uses

The strategic plan for the Hope Valley-Wattleup Redevelopment Project (HVWRP) provides a long-term framework for the development of a regional industrial location of strategic importance. The strategic plan is not a traditional zoning plan but establishes the broad intentions and principles for the future development of the area.

The land use strategy depicts general and transport-related industry in the Hope Valley area, general industrial development between Long Swamp and the future extension of Rowley Road, transport-related uses around the Wattleup town site, and predominantly general industrial development in the northern part of the redevelopment area. At the eastern and northern entrances to the redevelopment area, the proposed use of land is for eco-industrial and commercial office uses.

Other initiatives within the area will include commercial land uses over the Wattleup townsite, resource recovery over and around the existing waste facilities north of Wattleup townsite. Long Swamp and Conway Road Swamp will be retained for parks and recreation and conservation purposes. An east-west linkage of vegetation from Conway Road Swamp east to the proposed Fremantle-Rockingham Highway road reserve will also be retained for parks and recreation and conservation purposes.

An east-west vegetated linkage extending from the proposed Fremantle-Rockingham Highway road reserve to the Hendy Road Swamps, with a vegetated north-south linkage to Long Swamp, as well as other potential significant “green links” and additional areas of remnant vegetation, have also been identified as having potential for conservation. This potential will be considered at the precinct planning stage subject to further environmental investigations.

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Major transport elements include existing and planned infrastructure. Rockingham Road, the Fremantle to Rockingham rail line, the planned Rowley Road infrastructure corridor, and Anketell Road are all identified as major elements. The local network, via Russell, Wattleup, Hope Valley, Abercrombie and Postans Roads, will feed into the identified elements of the regional road network. Future access to the rail line for freight and regional transport purposes is also planned. The focal point of public transport service to the area is via a central transitway.

Fourteen planning precincts are used to define the proposed on-the-ground changes. The precincts incorporate a variety of environmental, social, economic and infrastructure constraints which direct new land use opportunities for redevelopment. Planning precincts will ultimately guide Structure Plans and assist the WAPC in assessing development applications.

### 1.3 This Environmental Review

The EPA's Instructions identifying the relevant environmental factors to be assessed and outlining the scope of work for preparation of this Environmental Review document are included as Appendix A.

In preparing this report, the environmental investigations previously presented within the SWOT Analysis (APP, 2002) and the Proposed Master Plan Report (APP, 2003), and the specialist services provided by Environmental Alliances are acknowledged.

The Environmental Review process is strongly linked to the planning approvals process so that the planning and environmental assessments are integrated and conducted simultaneously. A flowchart providing details on the Hope Valley-Wattleup Redevelopment Plan planning and approval process is provided in Appendix B.

The Proposed Master Plan and the Environmental Review documentation are now open for public review and comment. Details on how to make a submission on the Environmental Review are contained at the front of this report.

At the close of the public submission period LandCorp is required to summarise and respond to issues raised within the submissions.

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In its assessment of the Proposed Master Plan, the EPA will consider the environmental factors described in the Environmental Review and raised by the public, specialist advice from Government agencies, the response to submissions report, the EPA's own research and in some cases, research provided by other expert agencies.

At the end of the assessment, the EPA reports and make recommendations to the Minister for the Environment on the acceptability of the Proposed Master Plan, as well as the conditions and procedures that the EPA considers needs to be applied to meet the EPA's objectives. The EPA's report and recommendations (referred to as the Bulletin) is then made publicly available, and copies are provided to the Minister for Planning and Infrastructure, any other Minister likely to be concerned in the outcome of the Proposed Master Plan, and LandCorp. LandCorp's response to submissions report is also included as an appendix within the EPA's report and recommendations to the Minister for the Environment.

The Bulletin release is advertised in the EPA's advertisement in Monday's *The West Australian* newspaper as well as on their web page [www.epa.wa.gov.au](http://www.epa.wa.gov.au) The EPA's Bulletin will also be made available for download from this web page.

All parties, including the public, can appeal to the Minister for the Environment against the content of the report or its recommendations at a cost of \$10. Appeals are open for two weeks following the Bulletin release date.

The Minister for the Environment negotiates with the Minister for Planning and Infrastructure on the appeals and environmental conditions that may be required for the Proposed Master Plan. The conditions are then released to the public.

Once finalised, the conditions are incorporated into the Proposed Master Plan text before final approval for the Proposed Master Plan is granted. Final approval for the Proposed Master Plan is given by the Minister for Planning and Infrastructure and not by the Minister for the Environment.

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## 2.0 THE PROPOSED MASTER PLAN

### 2.1 Proposed Master Plan Location

The Hope Valley-Wattleup Redevelopment Area (HVWRA) consists of approximately 1,426ha of land located midway between Fremantle and Rockingham, in the south-west corridor of the Perth Metropolitan Region (Figure 1). The closest point is located approximately 40km south of the Perth Central Business District.

The existing Wattleup town-site is centrally located within the Redevelopment Area, with the Hope Valley townsite located at the southern end. The subject land is surrounded by Coogee and Beeliar to the north, Mandogalup to the east, Postans and Kwinana Beach to the south, and Naval Base and Henderson to the west.

The northern half of the HVWRA is located within the City of Cockburn, and the southern half is located within the Town of Kwinana. This area is one of the fastest growing corridors of the Metropolitan Region. The Western Australian Planning Commission's 'Future Perth – Population' (Draft Working Paper, 2001) predicts that the South-West corridor will grow to represent 14.5% of Perth's population, becoming the third most populated corridor (it is currently fifth) by 2031. This indicates that the corridor will experience a high rate of residential development over the next few decades, coinciding with the proposed development and implementation of the Proposed Master Plan.

### 2.2 Proposed Master Plan Description

The Hope Valley-Wattleup Redevelopment Project Proposed Master Plan (HVWRPPMP) reflects an intention to facilitate the detailed planning and development of a regional industrial location of strategic importance. Table 2.1 summarises the key characteristics of the Proposed Master Plan, which is further described in detail in the Proposed Master Plan Report.

The overall aim of the HVWRPPMP is to promote the sustainability of the region.

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**TABLE 2.1**  
**Key Proposed Master Plan Characteristics**

<b>Element</b>	<b>Description (all areas approximate)</b>
Proposal Description	A strategic industrial development incorporating general industry, transport related industry, resource recovery industry, commercial service centre, eco-industrial development, and recreational open space.
Total area of Proposed Master Plan	1,426.41 ha
Total gross area for Transport	390.80 ha
Total gross area for General Industry	611.95 ha
Total gross area for Eco-Industry	228.20 ha
Total gross area for Commercial	41.54 ha
Total gross area for Resource Recovery	62.40 ha
Total gross area for Parks and Recreation Reserves	41.75 ha
Total gross area for Precinct 13	49.77 ha
Number of Planning Precincts	14

Note: Gross areas include conservation areas, open space, landscape buffers, infrastructure and easements. Therefore these figures significantly over estimate the amount of land able to be developed for that purpose.

In accordance with Section 23 of the *Hope Valley-Wattleup Redevelopment Act 2000*, any town planning scheme under the Town Planning Act in operation in the Proposed Master Plan immediately before the commencement of the Act and the *Metropolitan Region Scheme* is repealed in relation to the HVWRA.

The HVWRA has been divided into 14 precincts (Figure 3). The Precincts defined on the Hope Valley-Wattleup Redevelopment Proposed Master Plan Map are based on envisaged areas of similar land use, development form, and character.

Precinct Planning Policies deal with the background and requirements specific to the individual precincts that comprise the Proposed Master Plan.

Planning precincts will ultimately guide Structure Plans and assist the Western Australian Planning Commission (WAPC) in assessing development applications.



A summary of the purpose and intended land uses of each of the precincts is provided in Table 2.2.

**TABLE 2.2**  
**Description of Planning Precincts**

No.	Name of Precinct	Intent of Precinct	Possible Land Uses
1	Southern Industrial	It is intended this precinct be developed for general industrial purposes and open space.	It is envisaged uses associated with the adjacent 'Motorplex' and transport area (Precinct 2) will occur in the precinct. The precinct is also well located to accommodate bulk goods handling and storage associated with the existing bulk cargo port at Kwinana.
2	Southern Transport	It is intended this precinct be developed for transport industry and related purposes. This reflects its proximity to the existing Kwinana bulk cargo port and the proposed outer harbour.	Bulk goods handling and freight related industries are envisaged in the precinct. Proximity to the freight rail line will also create potential for transport related development in association with this infrastructure.
3	Long Swamp Industrial	It is intended this precinct be developed for general industrial purposes. Development adjacent to Precinct 14, Long Swamp and Postans Park, should be compatible with this setting.	An emphasis towards small-scale light and service industrial development. In this regard, development should be less dense and low in scale, consisting of high quality buildings set amongst landscaping.
4	Central Transport	It is intended this precinct be developed as a major transport hub, taking advantage of existing and proposed regional transport links in the vicinity.	It is envisaged containerisation and related activities such as distribution centers, transport depots and large scale warehousing will establish in the precinct.
5	Wattleup Commercial	It is intended this precinct develop as a centralised commercial service centre, providing services to the general area and its workforce.	Built on existing infrastructure, this recognised centre will provide for the development of general commercial and service related uses in addition to retail (shops) and office uses.
6	Eastern Gateway	It is intended this precinct be developed as a gateway eastern entrance to the Redevelopment Area.	Business park uses in high quality (landmark) buildings and landscaped settings are anticipated to be developed in this area. Industrial uses which achieve positive environmental and social outcomes may also be permitted in this Precinct.
7	Northern Transport	It is intended this precinct will be developed for transport and related industry, with a stronger general commercial component.	In contrast to Precinct 4, service and light industrial uses directly related to transport and similar industries are also considered suitable for development in this precinct.

No.	Name of Precinct	Intent of Precinct	Possible Land Uses
8	Resource Recovery	It is intended this precinct will be developed as an integrated waste management and resource recovery area.	The area will develop from its current waste disposal land use to an area that treats domestic and commercial waste in a manner that recycles waste such that it can be reused.
9	North-East Gateway	It is intended this precinct be developed as a second gateway entry point on the eastern side of the Redevelopment Area.	Business park uses in high quality (landmark) buildings and landscaped settings are anticipated to be developed in this area. Industrial uses which achieve positive environmental and social outcomes may also be permitted in this precinct.
10	Russell Road Industrial	It is intended this precinct be developed for general industrial purposes.	Uses and industry within the precinct will serve other businesses and industry in the Redevelopment Area, the KIA, and commercial and industrial centres in the south west corridor. Medium to large scale development is anticipated with the precinct.
11	Northern Industrial	It is ultimately intended this precinct be developed for general industrial purposes. In the interim however, the existing use of land is expected to continue.	Similar to Precinct 10, medium to large-scale development is anticipated adjacent to Russell Road. In the northern part of the precinct, where it adjoins the boundary of the Redevelopment Area, particular emphasis will be placed on a reduced scale, treatment and appearance of development. Upon cessation, a high degree of emphasis will be placed on the remediation of existing uses and development, providing for effective future development.
12	Northern Gateway	It is intended this precinct be developed as a gateway northern entry point, similar in terms of envisaged development to the eastern entry precincts.	Given the proximity of the precinct to ship building and related industries located within Henderson and Jervoise Bay to the west, the precinct is also intended to house a mix of land uses with a marginal balance towards marine related industry.
13	To be determined	<p>The ultimate outcome of land uses in Precinct 13 will be determined as part of the statutory public comment and assessment period of the Proposed Master Plan.</p> <p>The Environmental Protection Authority and the Western Australian Planning Commission have determined that until the Review of the Kwinana Air Quality Buffer has concluded, uses that may compromise its outcomes will not be endorsed.</p>	<p>The range of land uses for Precinct 13 that may be contemplated without compromising the Buffer review include, but are not limited to, the following:</p> <ul style="list-style-type: none"> <li>• Rural (status quo)</li> <li>• Light and General Industry</li> <li>• Service Industry</li> <li>• Medical Centre / Offices</li> </ul> <p>The public is actively encouraged to make submissions on any or all of these land uses.</p>



No.	Name of Precinct	Intent of Precinct	Possible Land Uses
14	Long Swamp	It is intended Long Swamp and environs be retained, enhanced and maintained as a wetland and area of open space. This will provide the southern part of the Redevelopment Area with a place of natural value and amenity.	Passive recreational pursuits in association with the protection of the conservation value of the lake and remnant vegetation through the precinct will be encouraged.

Any alteration to the intended development of a precinct, as provided for within the Proposed Master Plan, is subject to an amendment process. Notwithstanding, separate precinct planning policies which guide use, form, and character of development, are not contained within the Proposed Master Plan, and may be amended through a process intended to be no longer than 42 days.

The proposed land uses that may be permitted in each precinct are listed in Table 1 of the Proposed Master Plan and the precinct policies are attached to the Proposed Master Plan Report.

It should be noted however, that the outcome of the Kwinana Air Quality Buffer Review must be understood to determine the types of land use possible. Ultimately the mix of land use must be based on the desired long-term requirements of the region and how the Proposed Master Plan relates to the region.

It is intended that land in the Proposed Master Plan will be developed in accordance with current environmental Best Management Practices (BMP), as follows:

1. The nature of industrial development is to be conducive to surrounding land uses outside the Proposed Master Plan Area;
2. The Proposed Master Plan is to comprise a transitional buffer between the residential areas to the north and east and the heavy industry within the KIA;
3. The use or development of land is to not have individual or cumulative adverse environmental or social impacts on:
  - residential areas outside the Proposed Master Plan;



- other land uses and amenities within or outside the Proposed Master Plan;
- Conservation Category Wetlands or any sensitive environments within or outside of the Redevelopment Area;
- Cockburn Sound;
- Soil, groundwater and surface water;
- Air quality; and
- Future land uses within and surrounding the Redevelopment Area.

Except as stated in sub-clause 6.2.4.2 of the Proposed Master Plan, the WAPC shall not approve development of land unless there is a Structure Plan for the Development Area or for the relevant part of the Development Area. A proposed Structure Plan may be prepared by either the WAPC or the landowner. A Structure Plan provides the next level of planning detail, including more information about patterns of land use, infrastructure and transport within the planning precincts.

Part 7 of the Proposed Master Plan deals with the environment. This section has been included to ensure the protection and management of the environment through the planning and development process. The general principles regarding the content of this part have been the subject of discussion with the EPASU. The objective in this regard has been to provide a framework that responds to, and addresses, areas of environmental concern. Part 7 of the Proposed Master Plan will be updated where necessary following the environmental assessment process.

Appendices to the Proposed Master Plan consist of the Proposed Master Plan Map, a Reserves Map and a Development Area and Development Contribution Area Map.

The development control provisions of the Proposed Master Plan require the WAPC to have regard to any relevant planning policies and design guidelines made pursuant to the Proposed Master Plan in dealing with an application for development approval.

It is intended that LandCorp, under Section 5(2) of the *Hope Valley-Wattleup Redevelopment Act 2000*, will monitor and review the Proposed Master Plan.

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The Proposed Master Plan will result in a major change in the nature and management of land uses from a haphazard, largely unmanaged residential, rural and extractive industry focus, to a well-engineered, mixed use industrial / commercial park with improved technology and management practices.

### Existing and Proposed Transport

The Hope Valley-Wattleup area is currently well served by existing regional transport routes (see Proposed Master Plan Report and Figure 4 in this report). The highway infrastructure through and within the vicinity of the redevelopment area include five major primary distributor roads:

- Thomas Road;
- Cockburn Road;
- Rockingham Road;
- Perth-Bunbury Highway; and
- Kwinana Freeway.

As well as two District Distributor A roads; Russell and Wattleup Roads, and two District Distributor B roads; Anketell and Hammond Roads.

There is also one local distributor road, Hope Valley Road, and various access roads including Mandogalup Road. With opportunities for future industrial development in the Proposed Master Plan area, there will be a need for the provision of new transport infrastructure and services.

State Government initiatives currently propose the following additions to the transport networks in the vicinity of the HVWRA:

- South West Metropolitan Railway (SWMR) line;
- Fremantle-Rockingham Controlled Access Highway;
- Rowley Road extension; and
- Fremantle to Rockingham Bus Transitway.

The SWMR line is proposed to the east of the HVWRA, however the remaining proposals pass through the Proposed Master Plan area. The existing planning control area for the Rowley Road extension and the original corridor alignment from the

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*Metropolitan Region Scheme* for the Perth - Bunbury Highway have been retained within the Proposed Master Plan. The 100m widths of these roads, although variable, are considered sufficient.

Special detailed design will need to be undertaken due to the area's undulating topography and intersections of substantial traffic volumes and complexity, particularly the Rowley Road and Perth to Bunbury Highway. The DPI is in the process of planning for the road definition and alignment for Rowley Road and Anketell Road, to link to the ocean and the future Outer Harbour.

Rowley Road provides an important east-west linkage into the freeway and will become one of the most critical links to the region. Rowley Road will likely be designated as a freight route to provide access to the proposed outer harbour development.

Whilst the impacts of these proposals within the HVWRA have been considered in this Environmental Review, potential impacts of these proposals beyond the Master Plan area are outside of the scope of this assessment and may be assessed by the EPA as separate proposals when the alignments are better defined.

As part of the Master Plan other proposed additions or changes to the transport networks are to be considered. Road reserves currently cover most, but not all, roads. There are also some established road reserves, which are protecting corridors for the construction of proposed roads at a later date.

## **2.3 Justification for the Proposed Master Plan**

The Proposed Master Plan Report (APP, 2003) provides detailed justification for the proposal, however a summary of the main points contained within the report is described in the following sections.

### Government Recommendations

FRIARS identified the Fremantle – Rockingham region, focusing on the Hope Valley-Wattleup area, as the best location for the future development of industrial land within the Perth Metropolitan Region and “*arguably*” the State. This judgment was based on long-term advantages of the area, including integration with existing industry,

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infrastructure accessibility, and strong inter-regional links. These attributes give the area a strategic advantage as a future industrial and employment location over alternative locations. Additionally and equally as important, the qualities apply to a location that can provide a longer-term solution, that is, the establishment of a larger, integral industrial area as against piecemeal, small-area initiatives.

The State Government has also recognised a need to protect the industrial significance of the Kwinana Industry Area (KIA). The Government is keen to minimise constraints to further heavy and special industry in the Kwinana Industrial Area (KIA) having regard to the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999* (EPP). The HVWRA falls within this EPP policy area.

At the same time the Government is also keen to reduce the potential for any possible health and safety issues associated with people living close to the HVWRP and further industrial development in the Kwinana Industrial Area (KIA). The area that requires some priority in terms of acquisition and development is the Hope Valley Township.

*The Strategic General Industrial Land Study* was undertaken in 1996 and 1997 on behalf of the State Government. This study identified and assessed three potential general industrial sites within the Perth metropolitan area, including Kwinana. The merits of each were assessed in terms of growth projections and demand for industrial land. In total, demand for an additional 3,000ha of industrial land was identified, 1,750ha of which was recommended to be developed in the Kwinana area.

It should be noted that additional research was undertaken to forecast industrial land demand as part of the HVWRP. Utilising several methods, it is forecast that about 600ha to 1,100ha of additional industrial land (i.e. land not already designated for industrial use) is required to be accommodated in the South-West and South-East Corridor over the next 25 years. Notwithstanding the fact that these methods of forecasting are based upon assumptions that may or may not occur, there is sound reason to believe that the demand could indeed be greater due to implementation of strategic planning and management. In addition, as Perth's population increases there is the possibility that the market size will allow economies of scale to encourage industry to establish that would not otherwise.

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## Location

The HVWRA enjoys many location benefits as well as good infrastructure in terms of transport and utilities. The environmental and heritage attributes are either favourable for development or can be successfully managed. In other words, there are no significant infrastructure or environmental constraints to the development of the area. The northern end of the site has a number of short to medium term constraints through the existence of extraction areas and landfill. While it is important to manage these areas for their ultimate land use, they do provide viable industry in the immediate term.

Certainly one of the greatest opportunities for the Proposed Master Plan is the early development of the outer harbour in Cockburn Sound. This would provide the basis for a freight hub and allow all related spin off industry to provide the economic stimulus that would benefit the government and community. It is also important to consider the project area in the context of what it means economically to the region. The real opportunity for the State government is how land can be rationalised such that existing estates and land designated for industrial use can be relocated such that highest and best use is allocated to not only the Hope Valley – Wattleup area, but also throughout the Perth metropolitan area. The project area provides the necessary scale to consider industry over the long term, and hence make strategic decisions about the whole region's long-term economic future.

There are significant opportunities to locate educational facilities within the Proposed Master Plan. These facilities could be tied to the industries and provide the future skilled workforce. Research and development facilities that draw on the students as their pool of knowledge may also be appropriate.

## Economy

The majority of land use opportunities have the potential to increase employment opportunities within the region. The FRIARS Report indicates an estimated employment outcome of 10,000 new jobs based on the Preferred Land Use Strategy.

The development of the HVWRP could well establish the platform for the economic future of this State, and consequently requires that the planning does not compromise this opportunity.

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### Showcase Sustainable Development

The project gives Western Australia the opportunity to develop a world-class showcase for integrated and sustainable industrial development appropriate for the “next generation” of industrial activity. The redevelopment will occur within a time frame and in a manner that minimises social dislocation during the transition in land use, and efficiently utilises the infrastructure and geographic advantages of the region.

The United Nations Industrial Development Organisation (UNIDO) defines sustainable industrial development as:

*“...a pattern of development that balances a country’s concerns for competitiveness, social development and environmental soundness either absolutely or comparatively.”*

According to the UNIDO, such development accomplishes three things:

- Encourages a competitive economy, with industry producing for the domestic as well as the export market;
- Increases productive employment, with industry bringing long-term employment and increased prosperity; and
- Protects the environment, with industry efficiently utilising non-renewable resources, conserving renewable resources and remaining within the functional limits of the ecosystem (APP, 2003).

By embracing this universal definition of sustainability, the focus for the HVWRP is on social progress, environmental protection, conservation of natural resources and economic growth. This focus therefore sets the overarching objective of the project, which is reflected in this Environmental Review.

### Summary

In brief, the Proposed Master Plan:

- Provides the basis for initiating land use change in the Kwinana air quality EPP buffer, removing the potential for future land use conflicts within the buffer area, and taking account of adjoining land uses;

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- Will protect, consolidate and support the KIA through the development of appropriate industrial and related uses between the KIA and adjacent areas;
- Will provide for a diversity of mutually advantageous industrial land uses in a regional setting containing similar uses, meeting demand in a location where existing infrastructure can be upgraded efficiently;
- Will provide significant employment opportunities over time, within the developing South-West Corridor and adjoining regions; and
- Will require the progressive removal of uses inappropriate to the intended development of the location for industrial purposes, most notably residential land use.

## 2.4 The Responsible Authority

The responsible Authority for the preparation and submission of the Proposed Master Plan and this Environmental Review is the Western Australian Land Authority (LandCorp).

LandCorp's role in the Proposed Master Plan is defined in the *Hope Valley-Wattleup Redevelopment Project Act 2000*. The Act gives LandCorp the responsibility to plan for, coordinate and undertake the redevelopment of the site, and to promote it as a premier mixed industrial and commercial area. The Proposed Master Plan allows for LandCorp to prepare a Structure Plan, Planning Policy or Design Guideline in respect of any matter related to the planning and development of the Redevelopment Area.

The Western Australian Planning Commission (WAPC) is responsible for administering the Proposed Master Plan. This includes determining planning applications, Planning Policies, Design Guidelines and other matters. The WAPC may also prepare a Planning Policy or Design Guideline in respect of any matter related to the planning and development of the Redevelopment Area.

## 2.5 Implementation

The timing for redevelopment is dependent on a number of external factors that are beyond control, including provision of services, timing of land acquisition or "take-up

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rates”, existing extractive mineral licences, topography etc. However, LandCorp has suggested that redevelopment is expected to be completed over 30 years or more.

LandCorp has identified particular precincts with limited constraints that will be priority areas for redevelopment. As an initial stage to the redevelopment, LandCorp will prepare Structure Plans to guide redevelopment within these precincts. LandCorp will initially focus on structure planning in Precincts 1 and 2, with redevelopment expected to commence within the next five years. Precinct 5 may be the next stage considered for redevelopment, however external factors and market forces will determine staging for the remainder of the redevelopment.

## 2.6 Consultation

Extensive consultation has been carried out with various relevant stakeholders during the process to date. Organisations included in the consultation process are summarised as follows:

### Planning

- Project Steering Committee
- Project Working Group
- Fran Logan – Member for Cockburn
- Norm Marlborough – Member for Peel
- Rural Landowner Community
- Kwinana Industry Council
- Hope Valley Community Management Group
- Wattleup Community Management Group
- Community Reference Group
- City of Cockburn
- Town of Kwinana
- Department of Minerals and Petroleum Resources
- Department of Industry and Technology
- Department of Premier and Cabinet
- Department of Environment
- Fremantle Port Authority
- Cockburn Sound Management Council

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Engineering and Environment

- Water Corporation
- Alinta
- Epic Energy
- CMS Energy
- Western Power
- Telstra
- Vodafone
- Optus
- Perth One Call
- Department for Planning and Infrastructure
- Main Roads Western Australia
- Department of Land Information
- Department of Mineral and Petroleum Resources
- (Former) Department of Environment, Water and Catchment Protection
- Department of Agriculture
- Fremantle Port Authority
- Department of Conservation and Land Management
- WA Sports Centre Trust
- Cockburn Sound Management Council
- Bureau of Meteorology
- City of Cockburn
- Town of Kwinana
- Cockburn Cement Limited
- Water and Rivers Commission
- Hydrosearch
- ALCOA
- BP
- URS
- ERM Mitchell McCotter
- Quit Motorplex
- Nyoongar Elders



### Market Research

- Department for Planning and Infrastructure
- Department for Industry and Technology
- Technology Park
- City of Cockburn
- Town of Kwinana
- City of Rockingham
- Kwinana Industries Council
- Swan Brewery
- Jandakot Airport
- Chamber of Commerce and Industry

Following a public workshop the preferred option for the development of the HVWRP was presented to the project Steering Committee on 15 August, 2002 and then to the key project stakeholders comprising government, industry and the community at the City of Cockburn on 9 September, 2002.

Following these presentations, the preferred option was distributed by mail to all landowners within the HVWRA, and then exhibited publicly at the Hope Valley Church Hall between 12 and 15 September, 2002. A total of 13 written responses were received, providing various comments on the proposed plan.

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### 3.0 GENERAL SITE DESCRIPTION

#### 3.1 Regional Context

The Hope Valley-Wattleup Redevelopment Area (HVWRA) is situated within the Fremantle – Rockingham region, which has experienced significant population growth over the past decade. The Perth metropolitan area's southbound development front will expand the Proposed Master Plan area role as a major employment sector with the expansion and consolidation of industry.

The HVWRA is located adjacent to Western Australia's primary heavy industrial area, the Kwinana Industrial Area (KIA) and is in close proximity to the State's principal port facilities at Fremantle. The KIA is identified in the *State Planning Strategy* (WAPC, 1996) and in preceding strategic planning documents as the long-term primary industrial area servicing the State. Strong economic growth associated with secondary processing of the State's mineral wealth continues to drive this region, providing demand for development of industrial land.

The location is currently characterised by rural land uses and a similar landscape, interspersed with numerous resource extraction sites and the two residential townsites. Major features within or adjoining the area include Rockingham Road, the City of Cockburn's waste facilities, the Kwinana rail line (extending north-south through the middle of the area), Cockburn Cement works, and numerous utility and energy-related infrastructure. The Rowley Road infrastructure corridor is a planned major feature.

At the closest point the HVWRA is located approximately 1.6km east of Cockburn Sound, which is the most intensively used marine embayment in Western Australia (CSMC, 2002). Cockburn Sound is a significant marine environment with a multitude of environmental, social and economic values, which require protection from catchment based impacts.

The HVWRA is situated adjacent to the Beeliar Regional Park, with areas abutting the study site for most of its length (north-south) on the west, and lie close to the boundary on the east. Long Swamp within the HVWRA was considered for protection within the Beeliar Regional Park, but remains in private ownership.

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The Beeliar Regional Park protects and conserves the wetlands and associated vegetation and fauna assemblages of the Cockburn Wetlands. Closest to the study site are the Brownman Swamp and Lake Mt Brown immediately to the west, and Thomsons Lake and Banganup Lake to the east (Figure 2). Much of the Beeliar Regional Park has high conservation value due to its rich diversity and complexity of ecosystems which are limited in distribution across the Swan Coastal Plain (APP, 2003).

In addition to these conservation areas, there is vegetation recognised in *Bush Forever* as being of regional significance abutting the HVWRA in the east, with some other *Bush Forever* sites located close to the boundaries of the study area.

The significance of development of the study site for these adjacent and nearby areas lies in the opportunity it provides for the enhancement or creation of ecological linkages between them (APP, 2003), and protection from hydrological impacts through appropriate stormwater treatment.

### 3.2 Topography

The topography of the HVWRA is undulating with slope gradients generally varying between 3° and 10°, the exception being along the centre of the study area where gradients tend to be less than 3° and the freight railway is aligned (Figure 5).

### 3.3 Geology and Geomorphology

The information provided in this section is reproduced from the Proposed Master Plan Report (APP, 2003).

The HVWRA is situated on the Swan Coastal Plain, within the Spearwood Dune System which comprises north-south elongated aeolian sand dunes, with intervening swales and wetlands which are generally elongated in a north-south orientation.

The superficial formations, comprising of quaternary sediments form the shallow geological units of the HVWRA (see Figures 6 and 7). The area is underlain by sands and limestone of the Tamala formation. Some clay and silt sediments are present and associated with the wetland and swamp areas. Karstic weathering has resulted in development of solution channels and caves.

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The extractive industry and raw material resource in the area is protected under the *Statement of Planning Policy (SPP) No. 10: Basic Raw Materials* (2000). The SPP No.10 recognises the importance of ensuring the extraction of basic raw materials occurs with minimal detriment to the local amenity and environment, including regionally significant vegetation and in a manner that allows for future use and development, and consistent with long term planning intentions for the area. It sets out the matters that are to be taken into account and given effect to by the Commission and local governments in considering zoning, subdivisions and development applications for extractive industries and those in the vicinity of identified basic raw material resource areas.

Much of the HVWRA is currently subjected to or proposed for future extraction (see Figure 8). The HVWRA contains both key and priority extraction areas. As defined in the WAPC's SPP No. 10 Key Extraction Areas are recognised regional resources providing for the long term supply of basic raw materials. Priority Areas are those locations of regionally significant resources which should be recognised for basic raw materials extraction. Both of these extraction areas should not be constrained by incompatible land uses or development.

The key basic raw materials being sourced are limestone, and to a lesser extent sand. As part of the Fremantle-Rockingham Industrial Areas Strategy (FRIARS) study and consultation, the possible life of mining reserves were estimated but these are subject to resource demand and rate of extraction. Cockburn Cement has recently gained approval to continue shellsand dredging and operation for 32 years by the EPA. Extractive industry licences, regulated by local government, usually range between 2 to 6 years with some up to 10 years. Many of the areas extractive licences expire in June, 2002, and the others in 2006. These licences are likely to be renewed if applied for as part of ongoing operations.

### 3.4 Existing Zoning and Land Uses

#### Planning Controls

The *Hope Valley-Wattleup Redevelopment Act 2000* removed local planning control and zonings of the area by the City of Cockburn and the Town of Kwinana in December 2000, affording this to the Western Australian Land Authority (LandCorp) and the WAPC.

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Preceding the preparation and approval of the Proposed Master Plan, planning and development of the area is to be in accordance with FRIARS.

The land use strategy for the HVWRA provides for long-term change to a range of industrial and related uses. Uses outside the HVWRA will continue to be subject to the provisions of the MRS and the relevant local planning schemes.

### Land Uses

The HVWRA is typically characterised by a number of existing rural and primary industries. These include:

- extractive industries in the form of sand and limestone operations;
- landfill sites;
- nurseries;
- turf farms;
- flower and vegetable market gardens;
- horse agistment; and
- hobby farms.

The resultant landscape is characteristically modified and the land ownership pattern fragmented.

The Proposed Master Plan area is currently developed at comparatively low residential densities. This reflects the constraints associated with the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999*, commonly referred to as the Kwinana EPP and the predominant rural activities characteristic of the area. The small Hope Valley and Wattleup town sites are the exception however, being of standard metropolitan densities.

Having regard for the relevant objectives and initiatives of the various State, regional and local policies applicable to the area, notably the protection and potential expansion of the KIA and the influence of the Kwinana EPP, residential use of land in the area is no longer deemed suitable. To this end, the Government has, and will continue to acquire residential properties within the two townsites that will one day be closed and redeveloped for industrial purposes. It is intended to close the Hope Valley townsite in the short term reflective of development staging, and Wattleup in

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the medium term. Residential uses within the rural areas will progressively be phased out as the rural areas are redeveloped.

### 3.5 Aboriginal Heritage and Culture

In December 2001 - July 2002, Australian Interaction Consultants prepared a desktop study for the Hope Valley – Wattleup Redevelopment Project under the *Aboriginal Heritage Act 1972* and the *Heritage Act 1990*.

AIC conducted a search of the Department of Indigenous Affairs (DIA) database which revealed 12 registered sites and 17 reports in the proximity of the HVWRA. Nine sites were described as archaeological, and three as ethnographic sites categorised as mythical (AIC, 2002). Two sites had no type nominated. None of the sites were plotted as being within the HVWRA.

Many of the archaeological sites were associated with wetland areas. The ethnographic sites identified included Mandogalup Swamp/Spectacles, Cockburn Sound/Indian Ocean and Cockburn Road (associated with a limestone ridge).

There is some potential for sites to occur within the HVWRA, particularly in areas close to wetlands such as Long Swamp. There is also the possibility of encountering skeletal materials during disturbance in the dunes (AIC, 2002). As part of the structure planning process detailed archaeological and ethnographic surveys will be undertaken.

### 3.6 European Heritage and Culture

In 2002, Palassis Architects undertook a study, including a field survey, to identify and analyse the cultural heritage of the HVWRA and provide an inventory of sites of heritage significance.

European heritage sites were found to be relatively numerous within and surrounding the Proposed Master Plan. Those sites that do occur within the Proposed Master Plan are on Municipal Heritage Inventories and have a variety of assigned conservation categories. The sites are not listed under National Heritage.

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Most historic homes/sites listed for heritage on the Municipal Inventory have low heritage ratings. Whilst these sites do not represent a threat to future development, they do represent an opportunity to provide some continuity and links with the past. The sites listed are shown on Figure 9.

As part of the Proposed Master Plan the WAPC, in consultation with LandCorp, must establish and maintain a Heritage List to identify those places within the HVWRA which are of cultural heritage significance and worthy of conservation under the provisions of the Proposed Master Plan, together with a description of each place and any significant structures, and the reasons for its entry.

If, in the opinion of the WAPC (following consultation with the LandCorp and the local government/s), considers a special planning control area is needed to conserve and enhance the cultural heritage significance and character of an area, the WAPC may, by resolution, designate that area as a heritage area.

The WAPC may also, in accordance with the *Heritage of Western Australia Act 1990*, enter into a heritage agreement with an owner or occupier of land or a building for the purpose of binding the land or affecting the use of the land or building insofar as the interest of that owner or occupier permits.

Despite any existing assessment on record, the WAPC may also require a heritage assessment to be carried out prior to the approval of any development proposed in a heritage area or in respect of a heritage place listed on the Heritage List.

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## 4.0 ENVIRONMENTAL ASSESSMENT – INTEGRATION

### 4.1 Sustainability

#### 4.1.1 Preliminary EPA Objective

The EPA's Objectives referred to in this report are from the EPA's Instructions for the Environmental Review (Appendix A).

To ensure as far as practicable, that the proposal meets or is consistent with the sustainability principles in the *National Strategy for Ecological Sustainable Development* (Commonwealth of Australia, 1992).

#### 4.1.2 EPA Scope of Work

The Scope of Work sections in this report are direct copies of the scope provided by the EPA in the Instructions on the Environmental Review (Appendix A).

*How will the scheme<sup>i</sup> ensure that new development and land use allowed by the scheme meets environmental sustainability principles?*

Identify existing and potential sustainability issues for the scheme area having regard for State and National directions and the EPA's position statements "Towards Sustainability" (October 2002a) and "Principles of Environmental Protection" (October 2002b).

Examples of issues include biodiversity protection, waste disposal and greenhouse gases. In relation to greenhouse gases, consider State (including the Western Australian Greenhouse Gas Strategy), National and EPA Guidelines and policy.

Identify scheme mechanisms and complementary planning mechanisms to facilitate environmental sustainability.

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<sup>i</sup> In the Instructions for this ER, the EPA refers to 'the Proposed Master Plan' as 'the scheme'. It's reference to the 'scheme' is equivalent to the 'Proposed Master Plan'.

#### 4.1.3 Existing Environment and Policies

The first comprehensive policy relating to ecologically sustainable development (ESD) in Australia was the *National Strategy for Ecologically Sustainable Development* (NSES) (Environment Australia, 1992). The goal of ESD in this instance is defined as:

‘Development that improves the total quality of life, both now and in the future, in a way that maintains the ecological processes on which life depends.’

All States and Territories in Australia adopted the NSES in 1992. The core objectives of the NSES are:

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations;
- To provide for equity within and between generations; and
- To protect biological diversity and maintain essential ecological processes and life-support systems.

The guiding principles of the NSES are:

- Decision-making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations;
- Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation;
- The global dimension of environmental impacts of action and policies should be recognised and considered;
- The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised;
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised;
- Cost-effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms; and

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- Decisions and actions should provide for broad community involvement on issues which affect them.

It is considered that in following an ecologically sustainable path of development, communities are better placed to reduce the likelihood of serious environmental impacts that arise from economic activity. The number of divisive and damaging confrontations that have characterised some development projects should also decrease. More practically, ESD will mean changes to patterns of resource use, including improvements in the quality of air, land and water, and in the development of new, environmentally friendly products and processes.

The Western Australian Government has embraced sustainability as a fundamental driver towards a better future for all Western Australians. The transition to a more sustainable future is a long-term agenda that requires rethinking the way we live, use resources, govern and do business. The draft State Sustainability Strategy ('the draft Strategy') (Government of Western Australia, 2002) is the first time that the Western Australian Government has addressed sustainability comprehensively. The draft Strategy defines sustainability as:

'meeting the needs of current and future generations through simultaneous environmental, social, and economic improvement.'

In brief, the draft Strategy proposes a set of sustainability principles that guide the way in which government, industry and communities should think about and approach the management of resources. The principles are focussed on engendering change that creates social, environmental and economic benefits for current and future generations.

The sustainability framework presented in the draft Strategy consists of:

- Foundation Principles:
  - Long-term economic health;
  - Equity and human rights;
  - Biodiversity and ecological integrity;
  - Settlement efficiency and quality of life;
  - Community, regions, sense of place and heritage;
  - Net benefit from development; and
  - Common good from planning.

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- Process Principles:
  - Integration of the triple bottom line;
  - Precaution;
  - Accountability, transparency and engagement; and
  - Hope, vision, symbolic and iterative change.
- Sustainability Visions for Western Australia:
  - Governance;
  - Global contributions;
  - Natural resources;
  - Settlements,
  - Community; and
  - Business
- Government's Sustainability Goals and Priority Areas for Action:
  - Goal 1: Ensure that the way we govern is driving the transition to a sustainable future;
  - Goal 2: Play our part in solving the global challenges of sustainability;
  - Goal 3: Value and protect our natural environment and ensure the sustainable management of natural resources;
  - Goal 4: Plan and provide settlements that reduce the ecological footprint and enhance quality of life at the same time;
  - Goal 5: Support communities to fully participate in achieving a sustainable future; and
  - Goal 6: Assist business to benefit from and contribute to sustainability.

Each section includes a summary that outlines the vision, objective, actions already underway, proposed actions, indicators and targets, global opportunities and further information. The final State Sustainability Strategy is scheduled to be completed in 2003 after extensive community consultation on the draft Strategy<sup>ii</sup>. The Strategy will be implemented over the next five to 10 years.

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<sup>ii</sup> Following the preparation of this Environmental Review document the Premier released *Hope for the Future: The Western Australian State Sustainability Strategy* on the 17 September 2003.

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‘Towards Sustainability’ is a Position Statement published by the Western Australian Environmental Protection Authority (EPA) in October 2002. This discussion paper brings together recent thinking about the way we can achieve the goal of sustainability.

The Position Statement acknowledges the political reality of Western Australia in 2002 of a growing population and a growing economy based largely on the use of natural resources, as well as a host of problems as a result of past practices.

It recognises that the transition towards a sustainable society will be dynamic, and that many changes will produce desirable social and economic outcomes, while reducing the environmental impacts of our activities. The movement towards a sustainable society is considered to be an ongoing journey comprising small steps that will accumulate over time to produce a significantly different society.

Broad commentary is provided on the following issues:

- What does sustainability mean?;
- Global environmental issues;
- Sustainability in natural resource management;
- Sustainability in the delivery and use of energy;
- Sustainable communities;
- Sustainability in transport decisions;
- Sustainable production and use of minerals and petroleum;
- Managing for sustainability: triple bottom line reporting;
- The knowledge base;
- Education for sustainability; and
- Planning for sustainability.

A provisional checklist is provided of questions to be asked when proposals are being considered. This checklist is presented in Section 4.1.4.

The Western Australian EPA published Position Statement No. 7 entitled ‘Principles of Environmental Protection’ in October 2002. This Position Statement provides the public and other key stakeholders with a summary of the key relevant principles of environmental protection that the EPA considers important in guiding its decisions and advice to government on matters of environmental protection.

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The policies of the EPA are guided by the following principles of environmental protection, natural resource management and sustainability:

A. Environmental, Social and Economic Considerations

Sound environmental practices and procedures should be adopted by everyone as a basis for sustainability for the benefit of all human beings and the environment today, while considering the environmental, social and economic needs of future generations.

B. Precautionary Principle

If there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

C. Intergenerational Equity

The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. The notion of stewardship is integral to intergenerational equity.

D. Conservation of Biological Diversity and Ecological Integrity

Biological diversity (the variety of all life forms – the different plants, animals and micro-organisms, the genes they contain, and the ecosystems of which they form a part) are considered at three levels:

- Genetic diversity
- Species diversity
- Ecosystem diversity

E. Improved Valuation, Pricing and Incentive Mechanisms

Environmental factors should be included in the valuation of assets, goods and services. Persons who generate pollution and waste should bear the cost of containment, avoidance or abatement ('the polluter pays'). Users of goods and services should pay prices based on the full life-cycle costs of providing goods and services ('cradle to grave').

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F. Shared Responsibility

Protection of the environment is a responsibility shared by all levels of Government, industry, business, communities and the people of Western Australia.

G. Product Stewardship

Producers and users of goods and services have a shared responsibility with Government to manage the environmental impacts throughout the life cycle of the goods and services, including the ultimate disposal of any wastes.

H. Eco-efficiency

Producers of goods and services should produce competitively priced goods and services that satisfy human needs and improve quality of life, while progressively reducing ecological degradation and resource intensity throughout the full life cycle to a level consistent with the sustainability of biodiversity and ecological systems.

I. Waste Hierarchy

Wastes should be managed in accordance with the following order of preference:

1. avoidance;
2. re-use;
3. recycling;
4. recovery of energy;
5. treatment;
6. containment; and
7. disposal.

J. Integrated Environmental Management

If approaches to managing impacts on one segment of the environment have potential impacts on another segment, the best overall environmental outcome should be sought at a local, landscape, catchment and/or regional level.

K. Best Practice

When designing policies, systems, procedures or technologies for environmental management, the best practicable measure available at the time should be applied.

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L. Continuous Improvement

The implementation by everyone of environmental practices should aim for continuous improvement in environmental performance. This requires that not only are relevant laws and requirements met but also environmental protection should extend beyond compliance.

M. Accountability and Transparency

The aspirations of the people of Western Australia for environmental quality should drive environmental management.

N. Enforcement

Enforcement of environmental requirements should be undertaken for the purposes of:

- (a) better protecting the environment and its economic and social uses;
- (b) ensuring that no commercial advantage is obtained by any person who fails to comply with environmental requirements; and
- (c) influencing the attitude and behaviour of persons whose actions may have adverse environmental impacts or who develop, invest in, purchase or use goods and services which may have adverse environmental impacts.

The management of enhanced global warming and other effects from the emissions of greenhouse gases is coordinated through the United Nations Framework Convention of Climate Change (UNFCCC). The Kyoto Protocol, developed in 1997 through the UNFCCC, established greenhouse gas emission reduction targets for developed countries of five percent of 1990 levels by 2008-2012. Australia negotiated an emissions target of limiting increases in greenhouse gas emissions to no more than 8% over the same time period. The Australian Government has signalled its intention to meet this target. Australia's strategic framework for this purpose is described in the National Greenhouse Strategy (NGS) (Commonwealth of Australia, 1998). The guiding principles of the NGS are:

- the need to have a Greenhouse response which is tailored to Australia's national interests;
- the need to integrate Greenhouse considerations with other government commitments;

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- the pursuit of Greenhouse action consistent with equity and cost effectiveness and with multiple benefits;
- recognition of the importance of partnerships between governments, industry and the community in delivering an effective Greenhouse response; and
- the need for action to be informed by research.

The Western Australian Government is developing a State Greenhouse Strategy (Government of Western Australia, 1998) to implement the NGS, guided by:

- Adaptation strategies to reduce vulnerability of human activities and natural systems to changes in climate and weather;
- Emissions reduction strategies to protect Western Australia's quality of life and economic development while reducing greenhouse gas emissions through better energy efficiency, industry re-engineering and restructuring, renewable energy sources, and improved land management and other practices;
- Carbon sink promotion, by revegetation and other processes that promote the absorption and storage of carbon dioxide from the atmosphere, to increase the amount of carbon stored in the Western Australian landscape; and
- New industry development to increase the contribution to the Western Australian economy of greenhouse friendly goods and services that take maximum advantage of new opportunities in response to climate change.

The Waste 2020 Taskforce released the Towards Zero Waste Strategy in January 2001. The Strategy is based on the Vision "Towards Zero Waste by 2020". Progress towards the Vision will be realised through five interdependent Goals:

- Sustainability: to achieve waste reduction, re-use and recycling outcomes which are environmentally, socially and economically sustainable;
- Commitment: to achieve the commitment and participation of all stakeholders in waste reduction, re-use and recycling practices and processes;
- Prevention: to prevent the generation of waste;
- Resource Recovery: to maximise the recovery and recycling of resources from waste; and
- Integration: to establish effective frameworks and structures to coordinate and facilitate waste reduction, re-use and recycling, the recovery of resources and the safe management of remaining wastes.

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Key Outcomes and Strategies are outlined for each goal. Forty three recommended Key Actions have been identified as being essential to the achievement of the Vision of the Waste 2020 Strategy. They are considered to be integrative by nature, and cover the following sectors:

- The Zero Waste Commission;
- Research, Development and Technology;
- Public Education;
- Management Plans; and
- Reporting.

**TABLE 4.1**  
**Waste Management Framework in Western Australia**

Level	Strategy	Details of Strategy
State	Towards Zero Waste – WAste 2020	Detailed above.
Metropolitan Region Scheme	Greater Perth	<p><i>Sustainable Environment Discussion Paper:</i> A consequence of diminishing existing landfill capacity is increasing waste management costs (maintenance and transport). This means that recycling of waste is much more economically attractive.</p> <p><i>Infrastructure Coordination Discussion Paper:</i> The key to solid waste management in the future is to reduce the amount of solid waste produced and to recycle and re-use the waste.</p>

Level	Strategy	Details of Strategy
Town Planning Scheme	Kwinana	The Council is primarily guided by the DoE and Worksafe in regard to waste management and disposal. The Council places an emphasis on separation of wastes on site, recycling, and cleaner production (i.e. waste minimisation and avoidance). The Council is also shifting towards placing an emphasis on 'recycling resources' rather than 'recycling waste'. There are two landfills operating in the Town of Kwinana – Abercrombie Road and Waste Stream Management.
	Cockburn	The Council does not have any specific policies referring to industrial waste management. The Henderson Landfill currently operates within the HWRA.
	Jandakot	Located in proximity to the HWRA is the Collex Hope Road Construction and Demolition waste recycling facility.
Master Plan	Scheme Provisions Section 4.2.8	Precinct 8 will be developed into a 'Resource Recovery' precinct: 'It is intended this precinct will be developed as an integrated waste management and resource recovery area. The area will be developed from its current waste disposal land use to an area that treats domestic and commercial



Level	Strategy	Details of Strategy
	Waste Management Strategy	<p>waste in a manner that recycles waste such that it can be reused. The process of recycling must be undertaken in a manner that does not create polluting by-products.'</p> <p>Sets framework and identifies locations for disposal of waste at Master Plan level – provides a clear strategy for whole HVWRA.</p>
Precinct Planning	Waste Management Strategy	Details of how each precinct will comply with Waste Management Strategy and create a more sustainable outcome.
Subdivision	Subdivision Approval	A Waste Management Plan should be required as a condition of approval of subdivision approval. Included in this management plan should be the intention to use the resource recovery precinct (Precinct 8) to dispose of demolition waste occurring within the subdivision.
Development	Development Application	<p>Section 7.2 Environment Objectives of the Scheme Provisions details waste management information to be included in Development Applications:</p> <ul style="list-style-type: none"> <li>- Section 7.4.2 (d): A list of all products, by-products, wastes and emissions to be directly or indirectly generated;</li> </ul>

Level	Strategy	Details of Strategy
		<ul style="list-style-type: none"> <li>- Section 7.4.2 (e): The management and mechanisms through which by-products and emissions such as noise, dust, odour, particulates, light, effluent and solid wastes are prevented, minimised, stored, transported and disposed of, and demonstration that all relevant standards recognised in Western Australia will be met.</li> <li>- Section 7.3.2 (h): utilise, where practical, alternative waste water disposal systems, including reuse and recycling.</li> </ul>

The Environmental Protection Authority released *Guidance Statement No. 12: Minimising Greenhouse Gas Emissions* in October 2002. This Guidance Statement specifically addresses the minimisation of greenhouse gas emissions from significant new or expanding operations. This Guidance Statement will be reviewed when new Government Policy is announced (The State Greenhouse Strategy).

The EPA's objective for greenhouse gas management is to reduce emissions to a level which is as low as practicable. To achieve this the EPA's environmental assessment objective is to ensure that potential greenhouse gas emissions emitted from proposed projects are adequately addressed in the planning/design and operation of projects and that:

- Best practice is applied to maximise energy efficiency and minimise emissions;
- Comprehensive analysis is undertaken to identify and implement appropriate offsets; and
- Proponents undertake an ongoing program to monitor and report emissions and periodically assess opportunities to further reduce greenhouse gas emissions over time.

The following should be included in Development Application documentation submitted by the proponent:

- Greenhouse gas emissions inventory and benchmarking:
  - Estimation of gross emissions of greenhouse gases likely to be emitted from the proposed project for each year;
  - Detail the project lifecycle greenhouse gas emissions and the greenhouse gas efficiency of the proposed project; and
  - Estimate for the proposal for each year of its operation any gross removals or greenhouse gases due to carbon sequestration activities.
- Measures to minimise greenhouse gas emissions
  - Identify improvements in energy efficiency, conservation measures and the reduction of fugitive emissions where applicable; and
  - Indicate where potential savings in emissions can be made through the use of renewable energy sources.
- Carbon sequestration
  - Consider a wide range of carbon sequestration options and include intended measures for research and adoption. Options include: forestry and other revegetation, geological re-injection, chemical methods, soil uptake, and re-use.
- Minimising emissions over the life of the project
  - All design measures to minimise emissions should represent best practice at the time of seeking project approval;
  - Proponents should commit to an ongoing programme of monitoring, investigation, review and reporting of internal and external greenhouse gas abatement measures; and
  - Proponents should also consider and advise whether they will join the Commonwealth Government's "Greenhouse Challenge" voluntary cooperative agreement program.
- Benefits on a national or global scale
  - This section provides the opportunity for proponents to place the proposal in a national and global context so as to provide an understanding of where broader offset benefits might occur;
  - An opportunity is also provided for the proponent to provide an overarching statement in support of the proposal indicating where positive outcomes would be achieved in relation to greenhouse gas emissions.



#### 4.1.4 Potential Impacts

A sustainability assessment of the Proposed Master Plan has been undertaken, based on the key characteristics of the area against a generic suite of indicators. These key characteristics were based on the knowledge gained and information identified during the master planning process. The sustainability assessment was intended to go beyond just evaluating the level of sustainability performance and just mitigating the negative impacts of the proposed land uses, by searching for opportunities to achieve simultaneous improvement in all aspects of sustainability capital and principles.

To assess sustainability of the Proposed Master Plan, Arup's Sustainable Project Appraisal Routine tool SPeAR™ was utilised. SPeAR™ has been developed as a tool to assess a project, business or development's performance in terms of sustainability. It is an instrument that is capable of integrating the underlying issues associated with sustainability, namely economic, social and environment.

The benefit of this tool is its ability to assess a project throughout its development, from conceptual phase through to occupation. The framework for the appraisal method is a set of sustainability indicators that can also be considered as the key impacts associated with the Proposed Master Plan. These are outlined below:

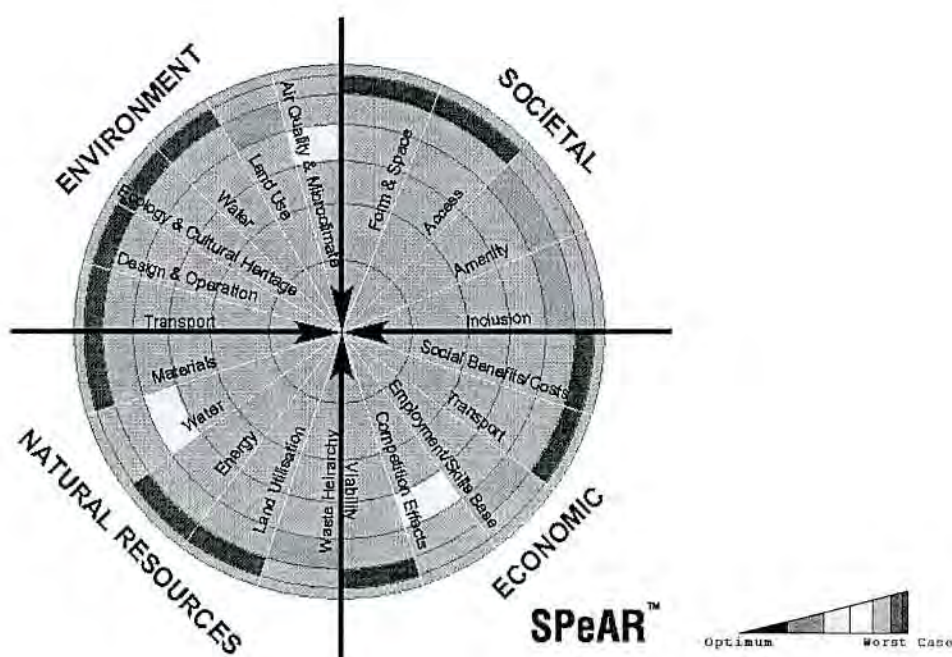
- Environment
  - Land use
  - Water quality
  - Air quality and microclimate
  - Ecology and cultural heritage
  - Design and operation
  - Transport
- Natural Resources
  - Materials
  - Water
  - Energy
  - Waste Hierarchy
  - Land Utilisation
- Societal
  - Amenity
  - Inclusion
  - Access
  - Form and Space

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- Economic
  - Viability
  - Competition Effects
  - Employment/Skills Base
  - Transport
  - Social Benefits/Costs

### Sustainability Assessment of the Existing HVWRP

Initial sustainability assessment and evaluation of the existing HVWRA shows that its sustainability performance has significant room for improvement. The SPeAR™ diagram indicates that the existing HVWRA is having, or has had, an extensive impact or little regard for environment and societal factors. Some sectors, currently assessed at a level of neutral sustainability, are likely to deteriorate and become unsustainable unless there are some immediate improvements or change.



### **Sustainability Performance Review**

#### **Existing Hope Valley – Wattleup Redevelopment Project Study Area**

There is little variation in results for the indicators within each sector - scores recorded are generally representative of the average performance scores for their sector. No indicators received an optimal performance but in some cases a worst-case performance measure was received.

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The best sustainability performance recorded a neutral sustainability (0). This was achieved in the following sectors: Water, Competition Effects and Air Quality and Microclimate. Although Air Quality and Microclimate might appear questionable, given the HVWRP within the Kwinana EPP, considerable effort and measures have been taken to monitor, minimise and preserve the air quality and microclimate within the HVWRP and there are signs that the level of emissions is decreasing.

The next level of sustainability performance recorded was -1. This was achieved in the following sectors: Land Use, Waste Hierarchy, Employment/Skills Base, Societal Amenity and Inclusion. All other sectors score a sustainability performance level of -2. No Sectors recorded a level of worst-case sustainability.

In its current state, the area's sustainability performance level has not achieved equilibrium or best practice and is showing signs of deterioration. Unless improvement and preferential changes are made to boost performance in 17 out of the 20 sectors, this deterioration of the HVWRP's sustainability will continue.

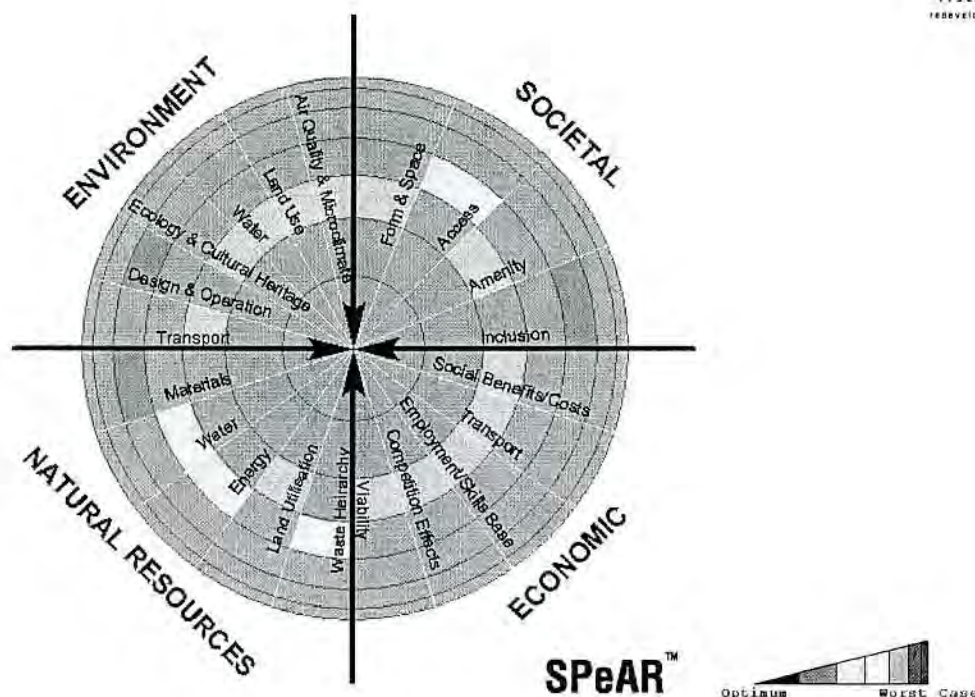
#### Sustainability Assessment of the Proposed Master Plan

The assessment of the HVWRP indicative land use plan (Proposed Master Plan) received a much higher level of sustainability success, with clear improvements in the majority of the sectors. Some sectors made larger improvements than others, with certain quadrants (e.g. Economic) clearly showing the benefits that will be derived by redeveloping the HVWRA. The sustainability assessment of the Proposed Master Plan assesses the HVWRA when fully developed in accordance with the plan's design and recommended/expected management.

The difference between scores received against the worst-case and optimum criteria for each indicator had much less variation than those received for the existing land uses within the HVWRA. These scores mirror the average score and are reflected in the level of sustainability performance recorded. Neither the optimum nor the worst-case criteria were recorded during the sustainability assessment of the Proposed Master Plan.

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### Sustainability Performance Review

#### Hope Valley – Wattleup Redevelopment Project Proposed Master Plan

Those sectors that received a less than neutral sustainability score (-1) included Materials, Design and Operation, and Inclusion. This is due to a number of reasons but they are offset with the larger improvements made as part of the overall redevelopment. For example, the progressive phasing-out of the extractive industries contributes to social and economic benefits such as continued income, employment opportunities and job diversity and improves the sustainability for these quadrants. However, the mining of a non-renewable natural resource is considered unsustainable and hence the poorer sustainability performance score of the Materials sector in the Natural Resources quadrant. For the Design and Operation sector the type of industries being proposed for the HVWRA are likely to generate a level of environmental impact that, although acceptable, are not considered as those industries or land uses having least impact. Similarly, with local community and social identity changes, the sector of Inclusion has not achieved a higher level of sustainability.

Four sectors (Water, Energy, Waste Hierarchy and Access) received a neutral score (0), while the remaining 13 sectors received a better than neutral (+1) sustainability performance score. Redevelopment will see greater focus and consideration of all the key issues and sustainability principles, which are either accommodated in the design

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and/or recommended management requirements as part of the planning strategy and/or Proposed Master Plan. This is one of the major differences between the existing condition and the Proposed Master Plan. Where there is limited or no consideration, management, knowledge or support for an indicator then a low or worst-case score is assigned. In the case of the Proposed Master Plan, all key issues and their respective indicators have been considered and are expected to be managed at least to current standards.

The Proposed Master Plan supports the minimisation of demand for non-renewable materials, water, energy and waste generation, while maximising land utilisation. This is achieved through the progressive phasing-out of the extractive industries and through requiring the retention, re-use and recycling of stormwater and wastewater. The consolidation of easements and use of multi-purpose and dual-use corridors, as will the nature of the land use, will help optimise land utilisation.

Redevelopment will see greater use made of the project area. Through the structured planning, design and progressive staging and development of the HVWRA as a dedicated industrial park, with greater diversity and abundance of industrial developments, the social benefits and employment/skills base will result in major improvements. This will also be the case with transport and competition effects within the HVWRA. All of these will contribute to major improvements in the ongoing economic viability of the area, which is reflected in the uniform, better than neutral, sustainability performance score in this quadrant.

From a societal perspective, while the HVWRA will support a land use change from residential to mixed commercial/industrial, the Proposed Master Plan will encourage the implementation of improved societal benefits within the emerging workforce and regional community. These include greater diversity and productivity from industrial and commercial operations, improved/additional employment opportunities, enhanced social amenities in the parks and recreational areas, greenbelts, landscaping and support facilities such as better pedestrian access and public transport.

The environmental quality within the HVWRA will see considerable improvement through redevelopment. Currently, only limited consideration, mechanisms and/or management plans/systems are in place to protect or minimise the impacts of the receiving environment.

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With the limited exception of “buffers” around offensive traders, the Kwinana air quality EPP and a growing awareness of environmental issues and improving management practices within the community, there are limited means or consideration of the environment.

Redevelopment will result in the implementation of planning and engineering solutions for the area. Where these controls cannot be implemented up front or incorporated into the HVWRP’s design, then management requirements and policies have been recommended within the planning strategy and Proposed Master Plan. For example developers must recognise and consider potentially degraded land, including contaminated land, and develop processes to facilitate its rehabilitation for appropriate future use and land compatibility. Prior to a change in land use or development, the policies will require a preliminary site contamination assessment to be undertaken. Where the possibility of contamination is detected or suspected, then sufficient assessment and remedial works must be undertaken to satisfy the WAPC and DoE.

This assessment of the Proposed Master Plan shows an ability to achieve a holistic level of greater sustainability. Although not all sectors have achieved neutral or better than neutral levels of sustainability, these results are balanced by the benefits derived in other sectors. With some modification and incorporation of improved management measures as the HVWRP evolves, the current design can continue to be improved to enable greater levels of sustainability to be achieved.

The previous section identifies a provisional checklist devised by the EPA that utilises a series of questions relating to sustainability to establish potential impacts of proposals. These questions are presented in Table 4.2 together with the results of the SPeAR<sup>TM</sup> analysis.

The HVWRP gives Western Australia the opportunity to develop a world-class showcase for integrated and sustainable industrial development appropriate for the next generation of industrial activity. Effective partnering between public and private stakeholders; community and industry; practitioners and academics will achieve this. The redevelopment will occur within a time frame and in a manner that minimises social dislocation during the transition in land use and efficiently utilises the infrastructure and geographic advantages of the region. The industries to be established will be complementary to each other and utilise the unique attributes of the region.

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**TABLE 4.2**  
**Sustainability Checklist for HVWRP Proposed Master Plan**

Question	Proposed HVWRP
Does the proposal deplete non-renewable resources significantly?	No
Does the proposal deplete assimilative capacity significantly?	No
Does the proposal use natural resources responsibly?	Yes
Does the proposal satisfactorily restore any disturbed land?	Yes
Does the proposal follow the waste hierarchy and manage satisfactorily any waste produced?	Yes
Does the proposal incorporate best practice in water and energy efficiency?	Yes
Does the proposal make good use of best practice to prevent pollution?	Yes
Does the proposal increase use of non-renewable transport fuels?	Yes
Does the proposal use energy efficient technologies?	Yes
Does the proposal result in net improvements in biodiversity?	No
Does the proposal increase greenhouse gas emissions?	Yes
Does the proposal involve acceptable levels of risk?	Yes
Does the proposal have a secure foundation of scientific understanding of its impacts?	Yes
Does the proposal minimise the ecological footprint?	Yes
Does the proposal avoid or minimise adverse impacts and promote beneficial impacts on the surrounding community?	Yes
Does the proposal produce sustainable net economic benefits?	Yes
Does the proposal produce sustainable net social benefits?	Yes
Does the proposal add to heritage protection and provide a sense of place?	Yes
Does the proposal produce net environmental benefits?	Yes
Does the proposal contribute to a more equitable and just society?	Yes
Does the proposal interact positively with other likely developments?	Yes
Does the proposal provide new opportunities (social, economic or environmental)?	Yes

(Source: Towards Sustainability Preliminary Position Statement, 2002)

This table is intended to demonstrate that the above issues have been considered, and attempts have been made to address key issues. It is to be noted that justification is not provided for the above responses.

There is currently limited water supply, sewer and drainage infrastructure within the Redevelopment Area. Redevelopment of the HVWRA has the potential to enhance and expand the existing water reticulation network. Detailed design and planning will need to be undertaken by developers in conjunction with the responsible utility as part

of each precinct structure plan and/or subdivision to optimise infrastructure and performance. Due to the lack of an existing sewerage service to the HVWRP there is the opportunity to design and develop an integrated system as part of the overall redevelopment.

The emission of greenhouse gases from the HVWRA has the potential to contribute to climate changes resulting from the enhanced greenhouse effect. The contribution from these developments themselves is negligible in global terms; however, the embodiment of sustainable development principles in all areas of development is necessary to minimise greenhouse gas emissions and the potential for adverse consequence from climate change.

#### 4.1.5 Proposed Management

Comprehensive provisions exist to ensure, as far as practicable, that the Proposed Master Plan meets the sustainability principles outlined in 4.1.3. These are listed below:

#### ***1.7 The aims of the Proposed Master Plan are to —***

- (a) protect the Kwinana Industrial Area (herein referred to as the KIA) by resolving surrounding land use conflicts;*
- (b) protect significant heritage in the Redevelopment Area;*
- (c) conserve areas of local and regional environmental significance;*
- (d) minimise sources of pollution;*
- (e) distribute the cost of common infrastructure;*
- (f) ensure the development and use of land within the Redevelopment Area complies with accepted standards and practices;*
- (g) ensure that future development and use of land within the Redevelopment Area occurs in a proper and orderly way;*
- (h) promote sustainable development;*

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- (i) *facilitate development generally in accordance with the Fremantle-Rockingham Industrial Area Regional Strategy (Final Report, April 2000).*

Provisions exist to ensure that environmental objectives are not compromised, which aids environmental sustainability of the HVWRP.

## **7.2 Environmental Objectives**

*Land in the Redevelopment Area is intended to be developed and managed in such a manner as to:*

- (a) *prevent any potential adverse environmental impacts, including those related to health and amenity, extending beyond the Redevelopment Area;*
- (b) *facilitate the establishment of a transitional buffer between the relevant residential and heavy industrial areas;*
- (c) *support the protection of sensitive environments and areas of environmental significance within and outside the Redevelopment Area, including Beeliar wetlands, Cockburn Sound, Long Swamp and Bush Forever sites;*
- (d) *ensure that the aquifer is managed in a sustainable manner and that groundwater quality is maintained or improved;*
- (e) *provide for on-site retention and infiltration of uncontaminated storm water;*
- (f) *prevent accidental loss or release of effluent or waste from premises;*
- (g) *appropriately store, transport and use all dangerous and hazardous goods in accordance with the manufacturer's recommendations and regulatory requirements;*
- (h) *protect the water quality of Cockburn Sound by ensuring that no inappropriate level of nutrient load or other contamination leaves the Redevelopment Area and enters the Sound;*
- (i) *dispose of sewage and compatible wastes by connecting to a comprehensive sewerage system, or utilising an accepted alternative treatment system only when no comprehensive sewerage system is available;*



- (j) ensure no significant net increase of emissions, such as noise, dust, particulates, odour, other air emissions, litter or light, occur in or extend beyond the Redevelopment Area;*
- (k) ensure that the generation or release of any emissions is kept within acceptable health levels;*
- (l) maintain and or enhance linkages between fauna habitats and vegetation communities - such as remnant vegetation, reserves and wetlands - to facilitate connectivity, accessibility and interaction of species;*
- (m) implement and support environmental best practice;*
- (n) prevent the contamination of soil and water that exceeds allowable ecological or health levels;*
- (o) prevent contaminated soil or water interacting with and entering surface or ground water flows and extending beyond the Redevelopment Area boundary;*
- (p) minimise the impact of surface runoff so as to protect and maintain the integrity, functions and environmental values of natural catchments, hydrological systems and wetlands, within and adjacent to the Redevelopment Area;*
- (q) prevent unacceptable levels of individual, societal or environmental risk;*
- (r) protect, maintain and enhance air quality;*
- (s) promote energy efficient practices and processes;*
- (t) minimise land use incompatibility; and*
- (u) optimise development potential in an environmentally acceptable way.*

In addition to the above, specific Project Objectives are provided in the Proposed Master Plan Report regarding the management of social and environment factors that facilitate sustainability. These are listed below:

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### Social

*Transition of land use that:*

- *Minimises social disruption during transition*
- *Maximises employment benefits for the region*
- *Protects significant heritage*

*The Proposed Master Plan will ensure existing significant heritage aspects are protected and a social transition strategy is prepared that addresses the concerns of the community as the existing land use changes. The community will be consulted and kept informed of the planning process.*

### Environmental

*Environmentally sensitive development that:*

- *Minimises net emissions and waste*
- *Maintains or improves the quality of the receiving environment (air, land, water)*
- *Protects factors of environmental significance e.g.*
  - *Vegetation*
  - *Fauna*
  - *Wetlands*
  - *Groundwater and Surface Water*
  - *Cockburn Sound Marine Environment*

*The planning will address all environmental issues, including conservation of existing local and regional resources and minimising sources of pollution such that the existing environment is maintained or, where possible, improved. This will include addressing areas requiring remediation and the extraction of natural resources. The planning process will incorporate establishment of development guidelines and policies.*

The Proposed Master Plan has from the outset sought to incorporate sustainability principles into its framework. An excellent example of this is found in the following text relating to water management within the HVWRA.

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*To minimise the demand on the metropolitan water supply and generate environmental and economic savings, water conservation will be encouraged. The use of rainwater, grey water, stormwater and groundwater abstraction should be considered, with preference given to those developments that support these sustainability development practices.*

*On-site wastewater (stormwater and grey water) retention, treatment and re-use, through a variety of mechanisms including dual plumbing systems, will be encouraged and supported as part of redevelopment. Through this emphasis on sustainable alternatives, the infrastructure and associated corridors required to collect and dispose of waste and stormwater will be minimised as will the demand on the sewerage system. Through water-sensitive urban design during the detailed design and planning of precincts and subdivisions and the use of the existing wetlands, except for conservation category 1 wetlands like Long Swamp, drainage run-off will be controlled and groundwater recharge enhanced. The re-use of wastewater and stormwater for industry use, irrigation of greenbelts/streetscapes, parks, sport/recreational facilities will help minimise water use and enhance the local aesthetics and amenities of the HVWRA.*

The HVWRP offers significant opportunities for implementing sustainable development principles to conserve energy usage and minimise greenhouse gas emissions. These have been identified through the following measures.

### Planning

The various precincts will be developed to meet market demands and linked to local and regional transport nodes, energy infrastructure, shops, parks and population centres to operate as a system. Key industrial activities and corporations will anchor these precincts around which smaller support industries looking to form strategic alliances will be encouraged through normal commercial processes. This level of integration will inherently minimise materials and consumer transport requirements and their associated greenhouse emissions.

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## Eco Industrial Developments

Eco-industrial developments address the environmental problems created from the traditionally linear production process of extracting raw materials and fossil energy, processing the material and energy and dumping the waste back into natural systems, by seeking to close these processes such that resource use is minimised and waste is returned into the production process. This involves the development of businesses that cooperate with each other and with the local community to efficiently share resources (information, materials, water, energy, infrastructure and natural habitat), and planning materials and energy exchanges to minimise energy and raw materials use and minimise waste.

Eco industrial development is specially targeted for Precincts 6, 9 and 12. Specific eco-development opportunities exist in relation to energy recovery from production processes that will minimise greenhouse gas emissions, and could lead to reductions in some circumstances.

## Building planning and design

The Proposed Master Plan provides for the preparation of Planning Policies and Design Guidelines relating to the planning and development of the Redevelopment Area, some of which have been prepared. The development control provisions of the Proposed Master Plan require the Commission to have regard to any relevant Planning Policies and Design Guidelines made pursuant to the Proposed Master Plan in dealing with applications for development approval. A key Planning Policy is 1.2 which specifically relates to minimising greenhouse gas emissions through energy conservation in the planning, siting and design of buildings. The Policy is shown in Table 4.3.

## Power generation using alternative/renewable energy sources

Additional power-generating industries and services based on alternative/renewable energy sources are to be encouraged within the HVWRA. This will be implemented through a provision in the Planning Strategy. Developments for power generation based on alternative energy sources are fundamentally desirable to meet the demands for increasing air quality in the Kwinana and Perth air-sheds while maintaining the requirements for power of the immediate and Kwinana Industrial Area. The

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proximity of the redevelopment area to electrical power distribution infrastructure, natural gas and potential energy-from-waste sources to a range of small-to-medium scale industries, present some unique opportunities for renewable energy development proposals. State Government policies to further deregulate electricity supplies together with commitments to renewable energy from Western Power will assist the achievement of this measure.

It is considered that greenhouse gases emitted from the HVWRA are best managed at Development Application level. It is not possible at Master Planning, Precinct Planning or Subdivision planning to adequately address greenhouse gas emissions and abatement as it is unknown at those stages as to which specific industries will be located in each precinct.

Proponents should therefore prepare their Development Application in accordance with EPA Guidance Statement No. 12 to demonstrate consideration and compliance of the measures contained within the Guidance Statement.

Scheme provisions also exist to assist with management of greenhouse gases. Section 7.2 outlines the Environmental Objectives of the HVWRP. The following two sections relate specifically to air quality:

- 7.2 (j): ensure no significant net increase of emissions, such as noise, dust, particulates, odour, other air emissions, litter or light, occur in or extend beyond the Scheme Area; and
- 7.2 (r): protect, maintain and enhance air quality.

LandCorp will carry out structure planning in consultation with public transport agencies with a view to facilitating the provision of public transport.

Delivery of this redevelopment, including internal road intensification and improved connection to the existing regional transport network, will be complemented through a number of State Government initiatives. Additions proposed to the regional transport network in the vicinity of the HVWRA include the South West Metropolitan Railway (SWMR) line; Fremantle-Rockingham Highway; Rowley Road extension, and the Fremantle to Rockingham Bus Transitway.

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All will enhance accessibility and provide further opportunities for linking the HVWRA and its tenants to port facilities, the Perth CBD, surrounding residential areas and the South-West Region. A future bus/rail interchange also will increase the attractiveness of multi-modal access to the HVWRA and its facilities.

These transport developments will make the HVWRA a more suitable location for the proposed industry types and give it an advantage over some of the current Perth-based distribution centres. The southward spread of the metropolitan area and population growth is being serviced by the extension of the passenger rail network, in the form of the SWMR. The integration of this new service with other transport modes, particularly feeder bus routes and the bus transitway through the centre of the area, will be essential in delivering an emerging workforce to the HVWRA. Extensive consultation occurred with the Department of Transport to ensure that the Transitway was positioned to maximise catchment.

The Perth to Mandurah Rail Link is due to be completed during 2007. The two closest stations to the HVWRA will be Thomas Road and Leda. These stations will be linked to the Kwinana shopping centre and town centre by local bus routes. An opportunity exists to create a bus link for employees between the HVWRA and the Thomas Road and Leda railway stations.

#### 4.1.6 Proposed Outcome

With due regard to the planning principles underlying the HVWRP, the provisions within the Proposed Master Plan and legislative environmental management capabilities, the EPA's objectives for sustainability will be met.

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**TABLE 4.3**  
**Planning Policy 1.2 for Energy Conservation**

**PLANNING POLICY 1.2 - ENERGY CONSERVATION**

***Preface***

Achieving sustainable development is one of the aims of the Hope Valley-Wattleup Redevelopment Scheme. Accordingly, the Commission in association with the Authority, will promote, encourage – and in some instances require, high standards of energy efficiency in building design and site layout.

***Energy Conservation Principles***

Development should be designed wherever possible to incorporate or have regard for, natural lighting, solar access in winter and minimising solar impact in summer, cooling through natural ventilation, and reducing energy consumption in buildings, related structures and adjoining open areas such as storage yards and work depots. Energy conservation can be achieved through the following measures. The Commission may require one or more of the measures to be accommodated as part of any proposal or development design.

- Building siting/orientation to the north, with reduced east and west facing wall lengths (maximising solar access in winter; minimising solar impact in summer);
- Building siting/orientation and the strategic location of openings to take advantage of prevailing winds (incorporating sufficient protecting against associated rain);
- Location and shading of openings to reduce heating and cooling loads – landscaping and roof overhangs can assist in protecting internal spaces from summer heat whilst allowing solar access in winter;
- Use of purpose built solar energy devices such as solar panels/collectors for power supply and water heating;
- Use of insulating building materials, particularly as part of roof structures;
- Shading and/or grassing of parking areas; and
- Use of economy style air-conditioning, meeting minimum standards in terms of energy efficiency.

## 4.2 Land Use Compatibility

### 4.2.1 Preliminary EPA Objective

To ensure that the health, welfare and amenity of people and land uses are not adversely affected by emissions and risk generated by neighbouring land uses.

### 4.2.2 EPA Scope of Work

*How will the scheme ensure that neighbouring land uses are not unacceptably affected by any new land use or development allowed by the scheme?*

Identify land use compatibility issues that may potentially arise from the implementation of the scheme, including:

- compatibility between neighbouring new developments in the scheme area;
- compatibility between new uses in the scheme area, and land uses surrounding the scheme area; and
- the transition between current land uses and the proposed vision for the scheme area.

Discuss the management of compatibility issues relevant to each proposed precinct.

How will land use compatibility issues be addressed by the scheme for each precinct?

### 4.2.3 Existing Environment and Policies

As detailed in Section 3.4 the HVWRA currently contains a mixture of land uses from extractive and rural based industries through to residential townsites. The management of land use compatibility both within the HVWRA and external to the site is an important management issue to be addressed if the planned redevelopment is to avoid unacceptable impacts on existing and future sensitive land uses.

Although there are isolated and scattered residences and sensitive land uses throughout and adjoining the HVWRA, the most densely populated areas occur within the Hope Valley and Wattleup townsites, to the north of the Proposed Master Plan

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area (above Precincts 12 and 11), and to the east of the Proposed Master Plan area (adjoining Precincts 7 and 9).

The original *State Industrial Buffer Policy* (WAPC, 1997) is currently being reviewed. The intent of the review is to identify current industry risks and emissions and hence necessary buffers for their control, which the Department of Planning and Infrastructure would like industry to adopt voluntarily. There will be no specific or prescriptive development controls; however it will target a more performance-based approach. No substantial changes are expected, nor is it anticipated that the revised policy will have a more restrictive impact on the HVWRP.

In 1997 the EPA released a draft *Guidance Statement No 3: Industrial-Residential Buffer Areas (Separation Distances)* which provides guidance on the compatibility of sensitive land uses and certain types of industrial land uses. Residential and other sensitive land uses need to be protected from the impacts of industry including noise, odour, light spill, gaseous emissions and risk. The draft table of separation distances has recently been updated by the Department of Environmental Protection (now the Department of Environment).

Buffer requirements for industrial developments will determine which types of industry can locate where within the site. The EPA's draft Guidance Statement recommends generic buffers for different types of industry in the absence of project specific information. Examples of the types of industry that may be considered permitted within buffers of varying size generally according to the DoE update of Guidance No. 3 are shown in Table 4.4. Separation from environmentally significant areas may also be a relevant consideration, as addressed elsewhere in this document.

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**TABLE 4.4**  
**Generic Industrial-Residential Buffer Areas**

(Note: Table is Indicative Only – Distances shown generally reflect draft Table updated by DoE from EPA Draft Guidance No. 3 Industrial-Residential Buffer Areas (Separation Distances))

<b><u>Uses with indicative buffer distances of between 0m and 100m</u></b> Liquid Petroleum gas retailing (15-85m) Service station – normal operating hours (50m buffer required) Industrial gases – commercial/retail outlets (50m) Nurseries – no composting (100m) Most uses not listed below.	
<b><u>Uses with indicative buffer distances of between 100m and 500m</u></b> Aquaculture Automotive spray painting (200m) Bakeries – daytime operation Carbon Stripping (200-300m) Cattery zones (200m) Chemical storage – minor (200-300m) Cosmetics production Crematoria (200-300m) Drycleaners Fibreglass works (200–500m) Food or beverage products (100-300m) Greenhouse using manure (200-300m) or compost Horse stables (100-500m depending on size)	Joinery and wood working (100-300m depending on size) Metal coating (200-500m) Metal production or metal concentrates - up to 100 tonnes per year Milk products (200-500m) Motor body works (200m) Plaster manufacturing (200m) Service station – 24 hr operation (100-200m) Smallgoods Tannery – small, non-sulphide (200-300m) Transport vehicle depot (200m) Used tyres storage – general/tyre fitting
<b><u>Uses with indicative buffer distances of between 300m and 500m+</u></b> Beverage manufacturing Boat Building – organotin compounds not used or removed Briquettes manufacture Cement product manufacturing works – less than 5000 tonnes per year Ceramic goods manufacturing Chemical blending or mixing Concrete batching plant (300-500m depending on size) Fibreglass works (200 or 500m) Food processing (200-500m) Flour mill Foundries – ferrous Foundries – aluminium Fuel burning (200–500m) Fuel storage – exceeding 2000 tonnes (300-500m fixed rooves)	Gas distribution Grain cleaning (300-500m) Incinerator - for waste wood Market Gardens (300-500m) Metal production 400- 1000 tonnes per year Paints and inks blending and mixing Pharmaceutical production (300-1000m depending on size) Rabbitries (500m) Scrap metal reclaiming works (300-500m) Smoking/drying/curing operations Textile production & operations (200-1000m) Turf farms & lawns (500m) Timber preserving premises Rubber products manufacturing Wreckers

**Uses with indicative buffer distances of 500m to 1000m**

Abattoir – no rendering	Grain elevator
Animal feed manufacturing	Heap/vat leach
Bakeries – night-time operations	Incinerator – biomedical, chemical or organic waste
Boat Building – organotin compounds are used or removed	Industrial gases production (500-1000m)
Calcium based compounds production	Maltworks
Carpet backing	Metal fabrication – up to 50 000 tonnes
Cement product manufacturing works – between 5000-150 000 tonnes a year	Metal finishing – galvanising
Chemical or oil recycling	Metal leaching
Chemical storage – bulk/major	Mineral wool or ceramic fibre
Clay extraction or processing – 1000m	Mushroom farm (500-1000m)
Dairies milking shed	Orchards
Dog kennel zone (500 or 1000m)Edible fat or oil processing	Paints and inks manufacture (500 -1000m)
Fellmongery	Pesticide manufacture (300-1000m)
Foam products manufacturing	Poultry farms (500 – 1000m)
Formaldehyde production	Quicklime plant (500m or 1000m)
Foundries – non-ferrous other than aluminium (500-1000m depending on size)	Resins manufacturing (500-1000m)Sawmill
Glass or glass fibre works	Screening works
	Seafood processing
	Used tyre storage – recycling (500-1000m)
	Vineyards
	Waste oil reclaiming refinery
	Woolscourer (500-1000m)

**Uses with indicative buffer distances of between 1000m to 2000m**

Aluminium production (1500-2000m)	Incinerator – for plastic or rubber waste (1000m)
Asphalt works	Gasworks (1000-2000)
Ammunition production	Gold ore (1000-2000m)
Bauxite refining	Livestock saleyard or holding pen
Bulk material loading or unloading	Mineral sands – dry & secondary
Cement product manufacturing works – greater than 150 000 tonnes per year	Pulp, paper or paper board treatment plant manufacturing (1000-1500m)
Cement works – production of cement clinker (1000-2000m depending on size)	Quarry – blasting or grinding
Charcoal production	Rendering works (1000-1500m)
Chemical fertilisers	Silicon refining (1500-2000m)
Coke production	Sodium cyanide production (1000-2000m)
Crushing of building material	Sodium silicate manufacturing (1000m)
Iron ore smelting (1000m)	Tannery – using sulphide (1000-2000m)
	Wood board manufacturing (1000-2000m)

**Uses with indicative buffers of >2000m**

Animal feedlot
Chlor-alkali works
Electric power generation power station (3000-5000m)
Gold roaster (5000m)
Oil or gas production (2000m)
Sulphuric acid plant (2000-5000m)
Synthetic rutile plant (3000m-5000m)
Titanium dioxide pigment plant (2000-3000m)



**Uses where indicative buffers are determined on a case by case basis**

Abrasive blasting works	Metal production or metal concentrates – over 1000 tonnes per year
Ammonia importation	Mine dewatering
Chemical manufacturing	Piggeries
Composting facility	Raceways
Crude oil extraction	Tailings disposal
Fly Ash disposal	Waste water treatment plants
Heavy industry site	Waste disposal

#### **4.2.4 Potential Impacts**

Industry and associated infrastructure generate a range of emissions including noise, air emissions (gases and odours), light-spill and public risk. The levels of emissions may at times exceed levels considered acceptable to sensitive land uses such as residential areas. Generally, levels of emissions decrease, or are diluted, with increasing distance from the source. Industries need to find an appropriate location so that an adequate separation distance (buffer) is achieved to the nearest residential area or sensitive land use (EPA, 1997b), as well as be designed and managed to minimise emissions.

The State Government proposes to minimise constraints to further heavy and special industry in the KIA by having regard to the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999* (refer Section 6.1) and establishing a general industry buffer zone to the KIA in the HVWRA. Residential uses within the KIA buffer are not considered appropriate.

The gradual “phasing-in” of the industrial uses will remove the existing sensitive land uses and reduce the potential for any possible health and safety issues associated with people living close to the future fully developed KIA. If the HVWRA is redeveloped for industrial use, it will protect both the industrial significance of the KIA and possibly the health of local residents from this source.

Although the predominant proposed use of the land is for General Industrial purposes the regional policies and objectives for the HVWRP infer the need to ensure that the whole of the area is not set aside purely for industrial development. In this regard, providing for a mix of compatible land uses that cater for different aspects of industrial and related development is necessary, including business park and commercial developments.



The Proposed Master Plan area is broken up into precincts with varying land use permitted in each precinct. A summary of potential impacts from the existing and proposed land uses from within each precinct is shown in Table 4.5.

**TABLE 4.5**  
**Summary of Potential Impacts from Existing and Proposed Land Uses**

Precinct	Title	Potential Emissions
1	Southern Industrial	Existing noise emissions from motor sports-related activities and within KIA risk contours. Potential noise from container parks and bulk goods handling, and a range of emissions from general industries. Risk an issue from possible fuel depots and service stations.
2	Southern Transport	Existing noise emissions from motor sports-related activities and within KIA risk contours. Emissions from existing light industry. Noise from future transport related industry and a range of emissions from general industry. Risk an issue from possible fuel depots and service stations.
3	Long Swamp Industrial	Existing noise emissions from motor sports-related activities and within KIA risk contours. Noise from future transport related and a range of emissions from general industry. Risk an issue from possible fuel depots and service stations. Extractive industries also may generate noise, dust and associated impacts.
4	Central Transport	Noise and possibly light overspill from containerisation facilities, distribution centres and warehousing, storage and other similar activities. Risk an issue from possible fuel depots and service stations. A range of emissions from general industry.
5	Wattleup / Commercial	Emissions from commercial and retail activities likely to be similar to urban average. Some potential noise issues from service industries, car wash and motor vehicle repair centres. Location of tertiary education establishment needs to consider buffers from uses proposed within Precinct 4.
7	Northern Transport	Noise and possibly light overspill from containerisation facilities, distribution centres and warehousing, storage and other similar activities. Risk an issue from possible fuel depots and service stations.
8	Resource Recovery	Emissions from existing Henderson landfill. Emissions from future extended waste separation, resource recovery, by-product processing industries dependent on specific developments but may require careful management for odour and dust. Noise from future transport related and general industry. Location of tertiary education establishment needs to consider buffers from uses.

Precinct	Title	Potential Emissions
10	Russell Road Industrial	Potential noise from container parks and bulk goods handling, and a range of emissions from general industries. Risk an issue from possible fuel depots and service stations.
11	Northern industrial	Emissions from existing Cockburn Cement works. Potential noise from container parks and bulk goods handling, and a range of emissions from general industries. Risk an issue from possible fuel depots and service stations.
12	Northern Gateway	Emissions from eco industrial, technology, and research and development uses (business park style) likely to be similar to urban average. Emissions from marine-related industries dependent on specific developments. Noise and dust impacts from extractive and rural industries. Location of tertiary education establishment needs to consider buffers.
13	To be Determined	To be determined based on proposed land uses.
14	Long Swamp	Existing noise emissions from motor sports-related activities and within KIA risk contours.

From this information it is clear that there are three main land use compatibility issues that may potentially arise from the implementation of the Proposed Master Plan, as identified by the EPA:

- compatibility between neighbouring new developments in the Proposed Master Plan (i.e. extractive industry to tertiary education facility);
- compatibility between new uses in the Proposed Master Plan, and land uses surrounding the scheme area (i.e. resource recovery centre and rural residential); and
- the transition between current land uses and the proposed vision for the Proposed Master Plan (i.e. current townsite residents and general industry development).

#### 4.2.5 Proposed Management

The management of land use compatibility both within the Proposed Master Plan area and external to the site is an important management issue to avoid unacceptable impacts on existing and future land uses. There is a requirement to ensure the interface of industry relative to adjoining and adjacent uses within and outside the HVWRP is appropriate.

There is also a need to ensure industrial development is appropriately located relative to existing and proposed transport networks, in the context of achieving a high degree connectivity between the area, location and other regions, and minimising the impact of traffic on sensitive adjoining areas.

In order to achieve this, the Proposed Master Plan has acknowledged the issue in its overriding environmental objectives for the Proposed Master Plan:

From Section 7.1 of the Proposed Master Plan:

*It is intended that land in the Redevelopment Area be developed in accordance with best known environmental practice, as follows.*

- (a) The nature of industrial development is to be conducive to surrounding land uses outside the Redevelopment Area;*
- (b) The Redevelopment Area is to comprise a transitional buffer between the residential areas to the north and east and the heavy industry within the KIA.*
- c) The use or development of land is to not have individual or cumulative adverse environmental or social impacts on:*
  - residential areas outside the Redevelopment Area;*
  - other land uses and amenities within or outside the Redevelopment Area;*
  - Air quality; and*
  - Future land uses within and surrounding the Redevelopment Area.*

Sections 7.3.6 and 7.4.2 form the basis of the management system proposed in the Proposed Master Plan to achieve the above objectives. Section 7.3.6 relates to the management of off-site impacts:

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*Land use and development within the Redevelopment Area shall be carried out and managed in such manner as to ensure that the safety and amenity of surrounding land uses, employees and the general public is provided, while having regard to the rights of the community, land owners and developers, and shall:*

- (a) incorporate an evaluation of the potential for conflict with incompatible neighbouring land uses, their activities and any associated risk, including but not limited to high pressure gas pipelines, high voltage electric transmission lines and major roads;*
- (b) incorporate risk minimisation and compliance with off-site risk criteria, demonstrated through quantitative risk assessment;*
- (c) not incorporate land uses and development that may result in excessive individual, societal or environmental risk, unless it can be demonstrated that the risk can be adequately managed;*
- (d) not create significant individual or cumulative off-site environmental or social impacts, or unduly disrupt or adversely affect neighbouring developments;*
- (e) not incorporate development that may prevent, inhibit or adversely affect other permissible land uses or developments, in accordance with Part 11 of the Scheme, unless it can be demonstrated through adequate provisions that no unacceptable influences are exerted;*
- (f) be conducive to surrounding land uses and provide a transitional buffer between the residential areas surrounding the Redevelopment Area and heavy industry within the Kwinana Industrial Area; and*
- (g) have regard for the requirements of the Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999, the Statement of Planning Policy No. 4: State Industrial Buffer Policy, EPA's Draft Guidance No 3: Industrial-Residential Buffer Areas (Separation Distances) or their current equivalents, and any other relevant requirements.*

In order to ensure that such measures are taken into consideration with the assessment of development applications by the WAPC Section 7.4.2 requires with each application:

- (b) Description of all developments, processes and activities to be carried out on the land;*
- (c) Description of the potential for these developments, processes and activities to impact on the environment and people;*

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- (d) *A list of all products, by-products, wastes and emissions to be directly or indirectly generated;*
- (e) *The management and mechanisms through which by-products and emissions such as noise, dust, odour, particulates, light, effluent and solid wastes are prevented, minimised, stored, transported and disposed of, and demonstration that all relevant standards recognised in Western Australia will be met;*
- (f) *A list of any dangerous and hazardous goods to be used or stored on, or transported to or from the site;*
- (g) *The management and mechanisms through which dangerous and hazardous goods must be used, stored or transported, including emergency spill management and disposal.*
- (h) *The societal and environmental risks of any hazardous activity or substance and the mechanisms through which risk will be prevented or managed to an acceptable level;*
- (i) *Management of the potential conflict between incompatible land uses and activities;*
- (o) *Management plans and commitments for the minimisation or protection of any significant environmental factors, impacts or issues; and*
- (p) *Any other information the Commission considers may be required to assess the application in accordance with the environmental provisions of this Part.*

*Where the Commission requires, the applicant shall provide certification to the satisfaction of the Commission that the environmental information required in clauses 7.4.1 and 7.4.2 has been prepared or endorsed by a suitably qualified person.*

In addition to the Proposed Master Plan, the Planning Strategy for the HVWRP provides a long-term framework for the development. The purpose of the strategy is to ensure a comprehensive approach to the planning and development of the Hope Valley-Wattleup area and environs, setting the parameters for more detailed planning. The Strategy is directed towards achieving the identified objectives for the redevelopment of the Hope Valley-Wattleup area, to be implemented through the Hope Valley-Wattleup Proposed Master Plan, and other measures including planning policies and design guidelines.

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Section C2.4.3 of the Planning Strategy outlines the Environmental Strategy which includes a number of actions and items relating to minimising emissions and waste, as well as improving the receiving environment:

- Land uses that may result in air, soil or water contamination/pollution must not be permitted unless it can be demonstrated that the proposed activities will not result in contamination above acceptable ecological and health investigation levels.
- The potential for the deterioration of air quality as a result of inappropriately located or managed development must be avoided and not permitted to extend beyond the HVWRP.
- Developments must have regard to the relevant requirements of the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy (1999)*, *Statement of Planning Policy No. 4: State Industrial Buffer Policy* and EPA's *draft Guidance Statement No 3: Industrial-Residential Buffer Areas (Separation Distances)*, or their respective equivalent.
- Developments must make provision for the design and implementation of systems that minimises the release, accidental or otherwise, of atmospheric emissions.
- Where industrial process would create dust, particulates or other atmospheric emissions, they must include provision for on-site containment, management, contaminant stripping and disposal.
- The potential for the exacerbation of noise as a result of inappropriately located or managed development must be avoided and not permitted to extend beyond the HVWRA.
- Land uses and development that may result in noise pollution must not be permitted unless it can be demonstrated that the proposed activities will not result in noise levels above acceptable levels in compliance with the *Environmental Protection (Noise) Regulations 1997*, or the current equivalent.
- Where developments or industrial process would create excessive noise levels, they must include provision for the design and implementation of noise abatement systems.
- Developments must not be permitted that may prevent, inhibit or adversely effect other permissible land uses or developments, unless it can be demonstrated through adequate provisions that no unacceptable influences are exerted.

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- Redevelopment must be conducive to surrounding land uses and provide a transitional buffer between the surrounding residential areas and heavy industry within the KIA.
- The redevelopment must have no significant individual or cumulative off-site environmental or social impacts, and unduly disrupt or adversely affect neighbouring developments.
- Redevelopment must maintain and, where practicable, improve air quality through appropriate design and management.
- Redevelopment must maintain and, where practicable, reduce noise levels within the project area through appropriate design and management.

Notwithstanding the above provisions within the Proposed Master Plan and the Strategic Plan which applies to all of the precincts, the overall planning has endeavoured to separate or buffer incompatible land uses within and external to the HVWRA as far as practicable. Precincts 5, 6, 9, 12 and 13 are close to sensitive land uses external to the HVWRA, and the uses permitted in these precincts have been selected to minimise any off-site impacts. These areas are likely to have similar impacts to the standard commercial average and will act as a buffer to the general industry core of the development.

Importantly, in addition to the measures proposed within the Master Plan planning process, the DoE/EPA will still also have the opportunity to assess proposals that may have a significant off-site impact, as they have deferred the assessment of potentially significant pollution, emissions and risk arising from or affecting land use and development within the Master Plan area.

For any proposed industries that may have significant off-site impacts, the EPA may require that buffer zones be considered on a case-by-case basis using appropriate modelling techniques for the principal potential impacts resulting from such industry. In these instances the industry proponent would be required to undertake this work prior to gaining a Works Approval from the EPA.

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### Management of Transition

The transition between current land uses and the proposed vision for the Proposed Master Plan needs to be carefully managed to avoid unacceptable impacts on residents who choose to stay within the HVWRA during the re-development. A proposed Social Transition Strategy has been prepared to deal with the transition issues of the residents within the HVWRA. The Strategy will ensure property acquisition and community impact are managed in appropriate and acceptable manner.

The Strategy details:

- support for residents to access information and advice on relocation and its impacts;
- provision of retail, recreation and transport services;
- impacts of redevelopment of townships;
- retention of education services during transitional period;
- township maintenance, safety and security; and
- property management.

Table 4.6 indicates the ownership details within the HVWRA at 30 June 2003. Government ownership accounted for 59% of the land holdings, and 33% were under private individual ownership at that time. The Government is continuing to acquire properties in the area.

**TABLE 4.6**  
**Residential Property Ownership in the Project Area**

Township	Ownership				
	Commercial / Industrial	Government Owned	Committed Applications	Private Individuals	Total
Hope Valley	0	150	3	38	191
Wattleup	9	267	5	65	346
Rural	45	66	6	171	288
<b>Total</b>	54	483	14	274	<b>825</b>

Source: LandCorp Project Office, figures current for 30 June 2003

A number of community members have expressed a desire to remain living, and in many cases working, within the project area until they decide they wish to relocate. The Proposed Master Plan will allow continued use beyond the redevelopment of the area in order that people feel secure in being able to stay should they wish to. The government acquisition program will continue until a private market is re-established in order to purchase properties should people desire to relocate.

Those who choose to remain within the project area will have the surety of the environmental controls set out in the Proposed Master Plan. Prior to any precinct being redeveloped, a Structure Plan for that precinct must be prepared and approved. If landowners within a precinct are not directly involved with the *preparation* of a Structure Plan, they will have the opportunity to make a submission during the advertising of the precinct structure plan.

At the development level, potential off-site impacts from any proposal will need to be documented by the proponent prior to development applications being considered by the WAPC. Should it be demonstrated that the development will have no adverse impact or pose unacceptable risk to neighbouring development, then the development can be approved with stringent conditions on construction and operations impacts.

Another element of concern to the rural landowners is access to potable water. Significant portions of the redevelopment area are not connected to scheme water and landowners are concerned about the quality of groundwater and rainwater following industrial redevelopment. It is suggested that investigations are undertaken to prioritise the provision of potable water to all parts of the redevelopment area.

The Proposed Master Plan designates the area occupied by the Hope Valley township as Stage One of the project which will be commenced within the next five years. Hope Valley is therefore considered the priority area for property acquisitions which will continue progressively. A rolling program of demolition commenced in 2003. It is currently forecast that all properties owned by Government will be demolished by September 2004.

Owners of properties immediately adjacent to the proposed Rowley Road corridor will experience the impacts and opportunities earlier than properties to the north. The Proposed Master Plan acknowledges the fact that many rural landowners will not have ready access to required infrastructure to be able to cost-effectively develop their land

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for many years. The reality is that not all parts of the project area can be serviced with infrastructure from the outset. Those landowners away from main infrastructure trunk lines will be able to either continue with their current land use or, alternatively, have the option of undertaking development of a transitional nature, as set out within the Proposed Master Plan.

#### 4.2.6 Proposed Outcome

With due regard to:

- the planning principles underlying the Proposed Master Plan,
- the proposed provisions within the Proposed Master Plan,
- the actions within the Planning Strategy, and
- the proposed Social Transition Strategy;

it is considered that the EPA's objective for the land use compatibility is able to be met.

### **4.3 Catchment Management and Water Quality**

#### 4.3.1 Preliminary EPA Objectives

To ensure that emissions will not adversely impact on the integrity, ecological functions and environmental values of Cockburn Sound, and are conducive to the improvement of the water quality of the Sound.

To ensure that emissions do not adversely affect environment values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

#### 4.3.2 EPA Scope of Work

This section is an amalgamation of the Catchment Management and Water Quality Factors within the EPA's Instructions.

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*How will the scheme ensure that the potential impacts of new land use and development in the scheme area on the water quality of Cockburn Sound will be such that the water quality of the Sound can be maintained or improved?*

*How will the ground and surface water quality of the scheme area be protected? How will adverse impacts on Cockburn Sound water quality be avoided, and preferably water quality improved?*

Identify groundwater and surface water catchments relevant to the scheme area, and their significance (include wetland and Cockburn Sound catchments). Where catchment boundaries may extend outside the scheme area, indicate this.

Discuss the existing groundwater and surface water regime, and the relationship with the Cockburn Sound marine environment.

Discuss how ground, surface and marine water bodies may be impacted by scheme activities.

Identify existing and potential issues relating to groundwater, surface water and marine water bodies, and the potential significance of these.

Discuss scheme measures that address the protection of water (surface and ground), to complement any other measures being taken through other processes.

Consider the implementation and preparation of a comprehensive water management plan for the scheme area.

Indicate processes for further consideration of water protection at each stage of planning.

Explain how the scheme will integrate with management of the Cockburn Sound catchment area, including integration with the Cockburn Sound Environmental Management Plan process, Cockburn Sound land use planning work, and other Cockburn Sound catchment management initiatives.

### 4.3.3 Existing Environment and Policies

#### Cockburn Sound

Cockburn Sound, which is approximately 1.6km west of the HVWRA situated at the closest point, is the most intensively used marine embayment in Western Australia (CSMC, 2002).

Uses within Cockburn Sound include:

- commercial fisheries;
- aquaculture;
- tourism;
- recreation;
- shipping;
- discharge of industrial and domestic treated waste;
- mining; and
- harbours and marinas.

The development of industry on the coastal strip and the intensification of land uses in the surrounding catchments have placed significant pressure on Cockburn Sound. The first comprehensive environmental study of the Sound in 1979 identified a large variety of industrial discharges into the Sound which had led to the deterioration of water quality and the widespread loss of seagrass beds (EPA, 2002). In the early 1980's, due to the reduction of inputs into the Sound by local industries, water quality had improved compared to the previous decade (EPA, 2002).

However, the *Southern Metropolitan Coastal Waters Study* (1991-1994) identified that nutrient levels in the water were only slightly better than the 1970's levels. It also found that although the loss of seagrass beds had slowed considerably, there was no evidence that it was re-establishing (EPA, 2002).

The EPA now believes that diffuse inputs from drains and contaminated groundwater, rather than direct industrial discharges, are believed to be the main input of nitrogen. Catchment management is therefore a crucial part of protecting the environmental, as well as the economic and social values of Cockburn Sound.

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Diffuse sources are largely due to land uses in that catchment and are difficult to estimate accurately, however DA Lord and Associates (2001) considered that the main contributors of nutrients to the sound are industrial groundwater, and groundwater under agricultural land at Spearwood.

Of the estimated 300 tonnes of nitrogen entering Cockburn Sound in 2000, DA Lord and Associates (2001) indicated that groundwater contributions were the main input with 200.1 tonnes. As industrial uses in the catchment have significantly decreased, the relative contribution of rural groundwater is starting to become more significant (DA Lord and Associates, 2001). In 2000, groundwater contributions accounted for 73% of total estimated discharge, of which 24% was from rural and other groundwater inputs.

Other contaminant loads due to human activities into the Cockburn Sound also include both diffuse and point sources. Contaminant loads from industrial point sources are documented as part of DEP (now DoE) licence provisions but there is little data for diffuse sources (DA Lord and Associates, 2001).

The Cockburn Sound Policy Area as defined within the *Revised Draft of the Environmental Protection (Cockburn Sound) Policy 2002* (EPP) is shown in Figure 11. The entire HVWRA is contained within the catchment of Cockburn Sound and the draft EPP boundaries.

The draft EPP sets out the legal framework for protecting the environment of Cockburn Sound, establishes the principles for environmental quality management and designates the environmental values to be protected and maintained. Once approved by the Minister for the Environment, the EPP will be gazetted and will become legislation under the *Environmental Protection Act 1986*.

The Policy broadly aims to (EPA 2002):

- Establish Environmental Values, Environmental Quality Objectives (EQO) and Environmental Quality Criteria (EQC) for waters in Cockburn Sound;
- Identify a program to protect and improve environmental quality to support the Environmental Values of Cockburn Sound;
- Require a response to any exceedance of the EQC;
- Integrate environmental management of the Sound and its catchment;

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- Provide for the establishment of an Environmental Management Plan to coordinate appropriate management actions against agreed objectives;
- Provide a mechanism for the Cockburn Sound Management Council to coordinate environmental management efforts; and
- Provide for a monitoring framework and regular reporting on progress against objectives.

The Environmental Values and Environmental Quality Objectives for Cockburn Sound are defined in Table 4.7:

**TABLE 4.7**  
**Environmental Values and Environmental Quality Objectives**  
**for Cockburn Sound**  
(after EPA, 2002)

<b>Environmental Values</b>	<b>Environmental Quality Objectives</b>
Ecosystem Health (ecological value)	Maintenance of ecosystem integrity
Fishing and Aquaculture (social value)	Maintenance of seafood safe for human consumption Maintenance of aquaculture
Recreation and Aesthetics (social value)	Maintenance of primary contact recreation values Maintenance of secondary contact recreation values Maintenance of aesthetic values
Industrial Water Supply (social value)	Maintenance of industrial water supply values

The EPP will also provide the legal basis for the Cockburn Sound Management Council's (CSMC) to develop and implement the Environmental Management Plan (EMP) for the Cockburn Sound. The Management Plan will:

- Incorporate the environmental quality objectives and criteria of the EPP;
- Recognise and facilitate multiple use management of Cockburn Sound;
- Foster the integration of environmental planning and management of the land and marine environment.

An *Interim Environmental Management Plan for Cockburn Sound and its Catchment* was prepared concurrently with the EPP, by the CSMC. The final version of the EMP will be released after the Minister has approved the EPP.

The Interim EMP details a five point plan of action towards implementing the EPP (CSMC, 2002):

1. Protecting the environmental values of Cockburn Sound;
2. Facilitating multiple uses of Cockburn Sound and its foreshore;
3. Integrating management of the land and marine environments;
4. Coordinating research and investigations; and
5. Monitoring and reporting on performance.

In May 2001, the CSMC advised the three local governments in the Cockburn Sound Management Area that the EPP would not in itself contain land use planning controls (CSMC, [http://www.wrc.wa.gov.au/region/csmc/Projects/landuse\\_planning.htm](http://www.wrc.wa.gov.au/region/csmc/Projects/landuse_planning.htm)). As such it was recognised that there was a need to develop local land use planning controls in order to protect the environmental values of the Cockburn Sound from catchment impacts.

Recently a Memorandum of Understanding was signed by the Cities of Rockingham and Cockburn, the Town of Kwinana, and the CSMC agreeing to the joint production of a Draft Local Planning Policy to develop land use planning controls in the Cockburn Sound catchment. The preparation of the Draft Local Planning Strategy is to start this month. Given that the Hope Valley-Wattleup Proposed Master Plan area covers a significant portion of the Cockburn Sound catchment it is expected that LandCorp will be consulted and have input into the development of the draft Local Planning Strategy.

### Wetlands

Wetlands occur within the southern portion of the study area. These are Long Swamp, and Conway Road Swamp and the Hendy Road Swamps. There are also four wetlands located immediately adjacent (i.e. within the Hill *et al.* 200m “Zone of Secondary Influence” to the study area (Figure 18) being Anderson Road Swamp, Lake Mt Brown, Wattleup/Pearse Road (partly within) and Wattleup Lake. The

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concept of the 200 metre zone of secondary influence is explained on page 7 Volume 2B Hill *et al.* 1996.

In addition, Thomsons Lake and Banganup Lake are located east of the study area, and Brownman Swamp and Lake Coogee are located west of the study area and Rockingham Road. All are outside of the Hill *et al.* (1996) 200m Secondary Zone of Influence from the HVWRA. Whilst there is no direct hydrological connection between these wetlands, an indirect connection may be considered to exist in that the wetlands are all surface expressions of the local groundwater.

In terms of the groundwater catchments of the wetlands, the study area is located outside of the Groundwater Environmental Management Area for Thomsons Lake (which corresponds to the groundwater catchment for this important wetland) and Banganup Swamp, and is on (or slightly within) the boundary of the groundwater catchment for the Wattleup/Pearse Road wetland and Wattleup Lake (EPA, 1998) (refer Figure 11). The remaining wetlands are within the groundwater catchment of the HVWRA.

Further details on the significance and policies relating to these wetlands are provided in Section 5.3.

### Groundwater

Groundwater flow in the study area is generally in a westerly direction, although small local directional variations do occur, towards Cockburn Sound (Figure 12). Groundwater depth decreases in a westerly direction from approximately 12m AHD at Mandogalup Road down to nearly 1m AHD at the Rockingham Road/ Cockburn Road intersection (WRC, 1997).

The HVWRA is underlain mainly by superficial limestone, marl and cemented sand deposits (the superficial aquifer), which hosts useable quantities of potable to brackish quality water (Arup, 2002).

Arup (2002) indicated that the average saturated water depth in each bore within the HVWRA is about 30 metres and measured bore transmissivities range from 500 m<sup>2</sup>/day to 800 m<sup>2</sup>/day. Abstraction rates vary depending on the use (i.e. domestic

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versus industrial) and can be in excess of 200,000 KL/yr. The size and number of existing groundwater abstraction bores is presented in Figure 13.

Recharge of the superficial aquifer is by rainfall, plus some upward leakage from the underlying Leederville aquifer. Although limestone has a very low intrinsic permeability (hydraulic conductivity), the presence of karstic features, such as dissolution cavities and cavernous flow tubes, imparts a complex permeability distribution through the limestone (Arup, 2002).

In general the limestone has an estimated bulk permeability of about 5 to 10 m/day, but where cavernous flow tubes are intersected bore permeabilities could be well in excess of 1,000 m/day (WAWA, 1993). Sand deposits in the area tend to have more uniform hydraulic properties than limestone, with permeabilities generally ranging between 5 to 20m<sup>2</sup>/day (Arup, 2002).

These permeabilities, coupled with the regional groundwater flow to the west, provide a conduit for groundwater under the HVWRA to travel to Cockburn Sound as a diffuse source (Arup, 2002).

The former Water and Rivers Commission (WRC) divided the Cockburn Groundwater Area into four administrative sub-areas based on geological and hydrogeological boundaries as part of the 2001 Interim Allocation Strategy, of which the HVWRA straddles three (see Figure 13). The WRC recently reviewed the total groundwater allocation for each of sub-area and believe the sustainable groundwater resources are nearly fully allocated (90%) (Arup, 2002). As a result, the WRC is considering reducing existing individual allocations.

The water table at any location can fluctuate by up to 1m in response to seasonal rainfall recharge and natural flow and pumping discharge (Arup, 2002). The varied depth to groundwater across the HVWRA is shown in Figure 14. The north-east of the study area and beneath a dune on Postans Road has depth to groundwater of approximately 30m. In contrast there are four low-lying areas in the south of the HVWRA with shallow depth to groundwater (less than 5m).

Groundwater quality is generally potable (less than 1000 mg/L TDS) with an average TDS for the study area being 450mg/L, although more brackish quality water occurs down gradient from some wetlands, the Alcoa mud lakes and in the vicinity of

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Cockburn Cement (Arup 2002). Groundwater chemistry indicates that salts are derived mainly from a marine source such as rainfall (sodium chloride) but there is also significant calcium bicarbonate saturation, presumably from dissolution of the limestone (Arup 2002).

There are isolated pockets of contaminated sites within the HVWRA, which have also affected the groundwater (see Section 6.3).

There is very little recent data on groundwater nutrient concentrations, with the majority of the data being several years old and collected down gradient from the Alcoa mud lakes. It has been suggested that the majority of the nutrient load in the local groundwater system is derived from a combination of septic systems or leachate from lawns and market gardens (ERM, 1999). The residential land within the HVWRA is not currently connected to a reticulated sewer system. Conventional septic systems have been found to add significant nutrient loads into the groundwater and this is reflected in the nitrate concentration in the vicinity of the two residential areas with levels generally exceeding the drinking water quality standard of 10mg/L (Lantzke, 1997).

Horticulture practices in the area are also likely to have had significant impact on the groundwater quality due to the heavy requirement of fertiliser, pesticide and irrigation water application to maintain crop production.

### Surface Water

Surface drainage in the HVWRA is virtually non-existent apart from minor feeder streams draining into wetlands. The wetlands are expressions of the groundwater table and are groundwater throughflow features (Arup 2002). No details have been provided on the quality of the surface water features within the site. However, it is expected that the wetlands within the study area will have been historically impacted by the potentially conflicting existing activities such as market gardening, agriculture, and extractive industry.

#### 4.3.4 Potential Impacts

The EPA has identified that the primary threat to water quality in Cockburn Sound is the effect of nutrient enrichment. The EPA considers that it would be unacceptable

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for there to be any further nutrient-related loss of seagrass area in Cockburn Sound. The EPA also expects that overall trend in nutrient-related water quality should be towards a reduced level of chlorophyll *a* (which is an algal biomass indicator of associated nutrient levels), with the long term goal of achieving and remaining within the Environmental Quality Guidelines for both chlorophyll *a* and water clarity.

Nutrients and other pollutants potentially arising from the implementation of the Proposed Master Plan could potentially reach Cockburn Sound via groundwater, and to a lesser degree by surface water drainage. Potential impacts on groundwater and surface water quality within the HVWRA, and subsequently Cockburn Sound, is therefore a highly significant issue that needs to be addressed and well managed.

In the past, urban stormwater has been managed by providing a highly efficient (engineering) drainage system to collect and convey stormwater run-off using a combination of pipes and linear engineered flow paths directly into wetlands, rivers, ocean or local sewerage systems. More recently however, there has been a shift in drainage design approach to stormwater retention, treatment, use, recharge, often linking with environmental restoration programs and recreation areas. The Water Management Strategy that will be prepared for the HVWRP will be based on the latter detention/treatment stormwater system, and there is not proposed to be any direct drainage into the existing wetland features within the site or to Cockburn Sound.

The HVWRP will result in the transition from horticultural activities, extractive industries, landfills and other potentially groundwater contaminating land uses to commercial/industrial land uses. Redevelopment will result in a major change in the nature and management of land uses from the existing haphazard, low-density developments and out-of-date management systems, if any, to a structured, well engineered multiple-use industrial park with improved technology and management practices (APP, 2003). It is expected that the transition from horticultural and residential land uses will result in a large decline in the contaminant load entering the groundwater.

However, if not adequately planned and managed, the change to industrial land use may increase the risk of contamination resulting from chemical or effluent spillages and leakages (APP, 2003). Therefore, strong planning provisions relating to the appropriate handling, containment and management of chemicals and waste effluent,

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have been included within the Proposed Master Plan to ensure that the risk of contaminating the groundwater is minimised.

Through the various management measures described in the following section including:

- Precinct planning and development controls;
- Measures to ensure onsite retention, treatment and infiltration of stormwater;
- Connection of the HVWRA to a reticulated sewerage system;
- Industries applying appropriate handling, containment and management of waste effluent; and
- implementation of Water-Sensitive Urban Design principles;

it is expected that the level of contamination that enters Cockburn Sound through either surface or groundwater flows will be reduced.

#### 4.3.5 Proposed Management

##### *Proposed Master Plan Objectives*

Potential impacts on groundwater and surface water quality within the HVWRA, and potential impacts on Cockburn Sound, are highly significant issues that need to be addressed and appropriately managed. The Proposed Master Plan has acknowledged the significance of this issue in its overriding environmental objectives for the Proposed Master Plan:

From Section 7.1 of the Proposed Master Plan:

*It is intended that land in the Redevelopment Area be developed in accordance with best known environmental practice, as follows:*

*d) The use or development of land is to not have individual or cumulative adverse environmental or social impacts on:*

- *Conservation Category Wetlands or any sensitive environments within or outside of the Redevelopment Area;*
- *Cockburn Sound;*
- *Soil, groundwater and surface water.*

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Section 7.2 of the Proposed Master Plan provides greater details on these intentions by providing detailed environmental objectives for the Proposed Master Plan. The Objectives state that land in the HVWRA is intended to be developed and managed in such a manner as to:

- *support the protection of sensitive environments and areas of environmental significance within and outside the Redevelopment Area, including Beeliar wetlands, Cockburn Sound, Long Swamp and Bush Forever sites;*
- *ensure that the aquifer is managed in a sustainable manner and with the objective of improving groundwater quality;*
- *provide for on-site retention and infiltration of uncontaminated storm water;*
- *prevent accidental loss or release of effluent or waste from premises;*
- *appropriately store, transport and use all dangerous and hazardous goods in accordance with the manufacturer's recommendations and regulatory requirements;*
- *protect the water quality of Cockburn Sound by ensuring that no inappropriate level of nutrient load or other contamination leaves the Redevelopment Area and enters the Sound;*
- *dispose of sewage and compatible wastes by connecting to a comprehensive sewerage system, or utilising an accepted alternative treatment system only when no comprehensive sewerage system is available;*
- *prevent the contamination of soil and water that exceeds allowable ecological or health levels;*
- *prevent contaminated soil or water interacting with and entering surface or ground water flows and extending beyond the Redevelopment Area boundary; and*



- *minimise the impact of surface runoff so as to protect and maintain the integrity, functions and environmental values of natural catchments, hydrological systems and wetlands, within and adjacent to the Redevelopment Area.*

### Water Management Strategy

Industrial developments typically include large surface area of impervious surfaces in terms of building roofs and large sealed areas which creates large volumes of stormwater run-off. Stormwater from urban/industrial catchments can convey pollutants to receiving waters. In order to achieve more sustainable development within the Proposed Master Plan area, stormwater management is included in the broader planning and design of the area. The quality of groundwater and level of contamination in Cockburn Sound can be improved through the appropriate development of the area which will include the phasing-out of some current practices and improved stormwater management.

A Water Management Strategy is currently being prepared, and will form a Planning Policy within the Proposed Master Plan. The structural and non-structural management practices proposed within the Water Management Strategy contain mechanisms to treat, retain, detain and trap stormwater run-off sufficiently to allow pollutants to be removed, filtered, settle and/or be neutralised by natural processes before infiltrating into the groundwater on site.

The Water Management Strategy Planning Policy will guide and direct proponents in the HVW Master Plan area. The Water Management Strategy Planning Policy will form part of the assessment criteria for new development applications by the WAPC. Section 2.3 of the Proposed Master Plan requires that the WAPC have due regard to the provisions of a Planning Policy and/or Design Guidelines and the objectives which the Planning Policy and/or Design Guidelines are designed to achieve before making its determination.

The overarching Water Management Strategy will form the basis for more detailed water balance assessments at the Precinct Planning level. The Strategy will address issues of protecting water resources, a better environment, and protection from flooding. The Strategy will be based on a catchment management approach, and provide the framework for undertaking more detailed site-specific investigations and assessment at the structure planning stage. The Strategy will encompass:

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- Nutrient and water quality management;
- Management of groundwater levels;
- Implementation of Best Management Practices;
- Wetland management
- Flood management
- Implementation timing and responsibilities; and
- Performance monitoring and reporting.

The HVWRP provides opportunities to enhance the retention and treatment of stormwater and use in the urban landscape by (from APP, 2003):

- Creation of parkland, greenbelts and the retention of remnant vegetation near wetlands, along transport corridors and between development cells, which act as habitat corridors and buffers, and will be used for surface water retention and onsite infiltration (please note there will be no direct drainage into wetlands);
- Provision (within road reserves and parklands) for the creation of artificial/linear seasonally dry wetlands, swales and sediment basins along transport corridors and as part of the minor/major stormwater management system;
- Phasing-out of horticulture and turf farming, landfills, extractive industries and the use of septic systems;
- Requirement as part of redevelopment for the connection to a deep sewerage system; and
- Stormwater containment and control along roads and onsite through the use of contamination and litter traps, gutters, kerbs, underground pipes, sediment basins etc. as part of the minor/major stormwater management systems.

These initiatives will be implemented within the Proposed Master Plan in accordance with current Water-Sensitive Urban Design (WSUD) and WRC's guidelines. The measures will be detailed within the Water Management Strategy for the development which is currently being prepared. By further incorporating WSUD principles into the detailed precinct planning (structure plans) and subdivision developments, the protection and maintenance of water resource values can be achieved.

The Strategy will take into account the Tamala Limestone and Sand and Spearwood Sand which underlies the majority of the site, which does not have high nutrient absorption capacity (the former highly reliant on the potential for the presence of

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preferential flow pathways). The average depth to groundwater is 15-20 m, and with the porous sands this makes much of the Master Plan area suitable for infiltration of collected stormwater. However, the actual infiltration rate for the site is not known and site specific investigations will also be required at later stages of planning.

The Strategy will require that individual properties/developments will need to demonstrate that they can capture and manage surface runoff and their wastewater. Developments must make provision for stormwater management that optimise the retention, consumption and/or infiltration of stormwater on site.

Where large roofed areas are present rainfall tanks will be encouraged to be installed to harvest rain, thereby reducing stormwater run off and providing a source of water for industrial use. However, it is noted that water collected by rainfall tanks in this area is not recommended for potable use. Grey water re-use through dual plumbing systems will be encouraged and could be applied as irrigation of green belts, parks, sport/recreational facilities.

There will be no direct stormwater discharge into Long Swamp or into any other wetlands identified within or adjoining the Master Plan area. However, undulating topography may impinge upon placement and type of drainage mechanisms and hence stormwater management may be considered within some of the buffer set aside for the wetlands, although it is noted that the DoE does not currently support this concept.

### Planning Strategy

In addition to the Water Management Strategy, the Planning Strategy for the Proposed Master Plan detailed in the Proposed Master Plan Report (Part C) also provides for the management of groundwater and surface water quality. The following excerpts from the Planning Strategy outline the management proposed for potential impacts on surface water, groundwater and Cockburn Sound.

#### Groundwater

- Redevelopment must maintain and, where practicable, improve groundwater quality and quantity through water-sensitive design and management.
- The intensification of flooding as a result of inappropriately located land uses and development must be avoided.



- Developments must make provision for drainage systems that optimise the retention, consumption and or infiltration of drainage on site.
- All development must be connected to a comprehensive sewerage system, with the exception of any existing single house where no such system is available.
- Where industrial processes create liquid effluent, they must include provision for on-site containment, management, contaminant stripping and appropriate disposal.
- Maintain and improve groundwater quality, aquifer integrity and yield.
- Developments must appropriately store, transport and use all dangerous and hazardous goods in accordance with the manufacturer's recommendations and regulatory requirements.

#### Cockburn Sound

- Protect the water quality of Cockburn Sound by ensuring no increase in nutrient loads or other contamination leave the premises and enter Cockburn Sound.
- Redevelopment must maintain and, where practicable, improve groundwater quality and quantity through water-sensitive design and management.
- Developments must make provision for drainage systems that optimise the retention, consumption and or infiltration of drainage on site.
- All development must be connected to a comprehensive sewerage system, with the exception of any existing single house where no such system is available.
- Where industrial processes create liquid effluent, they must include provision for on-site containment, management, contaminant stripping and appropriate disposal.
- Developments must appropriately store, transport and use all dangerous and hazardous goods in accordance with the manufacturer's recommendations and regulatory requirements.

#### Sewerage

- Detailed design of a comprehensive sewer system is required for each precinct structure plan/subdivision in liaison with the responsible utility.

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- Set aside land for up to 12 sewer pump stations to service the area. The sewer pump stations each require an area of approximately 20m x 20m.
- Examine opportunity to design and develop an integrated system as part of the whole HVWRP from commencement.

### Specific Proposed Master Plan Provisions

In addition to the management proposed in the above strategies the Proposed Master Plan proposes further controls on land use and development within the HVWRA in Section 7.3.2, Water Resource Management:

*Land use and development within the Redevelopment Area shall be carried out and managed so as to minimise the disturbance and contamination of water catchments and ground water through the appropriate siting, design, and management of development, in such manner as to:*

- (a) maintain the quality and quantity of water resources sufficient for existing and future environmental and human use;*
- (b) maintain, and where practicable, improve surface and groundwater quality through water sensitive design and management;*
- (c) make provision for drainage systems that optimise the retention, consumption and/or infiltration of drainage on site;*
- (d) avoid the potential for the intensification of flooding as a result of inappropriately located land uses and development;*
- (e) where industrial processes create liquid effluent, incorporate on-site containment, management, contaminant stripping and appropriate disposal;*
- (f) not impact on the flow or quality of surface or ground water on neighbouring land;*
- (g) be connected to a comprehensive sewerage system, with the exception of a single house where no such system is available;*

- (h) *utilise, where practical, alternative waste water disposal systems, including reuse and recycling;*
- (i) *have regard for the State Water Quality Management Strategy for Western Australia 2000, the Statement of Planning Policy No.27 Public Drinking Water Source and any other relevant advice; and*
- (j) *comply with the Water Management Strategy for the project area.*

#### 4.3.6 Proposed Outcome

With due regard to:

- the planning principles underlying the HVWRP and the proposed transition of land uses;
- Precinct planning, land use and development controls within the Proposed Master Plan and the Planning Strategy ;
- Preparation of a Water Management Strategy to ensure onsite retention, treatment and infiltration of stormwater;
- Connection of the HVWRA to a reticulated sewerage system;
- Industries applying appropriate handling, containment and management of waste effluent; and
- implementation of Water-Sensitive Urban Design principles;

the EPA's objectives for Water Quality and Catchment Management are able to be met.

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## 5.0 ENVIRONMENTAL ASSESSMENT – BIOPHYSICAL

### 5.1 Flora

#### 5.1.1 Preliminary EPA Objective

To maintain the abundance, diversity, geographic distribution and productivity of flora at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

#### 5.1.2 EPA Scope of Work

*How will the values of the native flora and vegetation of the scheme area be protected?*

Describe the flora and vegetation of the scheme area, and its context. Clarify the extent of any botanical research carried out.

The description should include vegetation associations (eg complexes), mapping/aerial photography showing remnant vegetation, condition, declared rare and priority flora and other species of interest, linkages and potential linkages, values and significance associated with the vegetation of the scheme area, in terms of local, regional and/or higher significance.

Identify any existing issues related to the flora and vegetation of the scheme area, and potential issues that may arise from the implementation of the scheme. Address likely impacts on flora and vegetation. Consider linkages incorporating remnant vegetation, enhancement of conservation areas, and revegetation/landscaping requirements.

Describe scheme measures to address the protection of native flora. Where will native flora be retained? Are there any revegetation/landscaping requirements? Indicate processes for further consideration of native flora at each stage of planning (eg studies before site works to check for significant flora).

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### 5.1.3 Existing Environment and Policies

A range of legislation is relevant to biodiversity conservation in Western Australia, including the *Environmental Protection Act 1986* (EP Act), the *Conservation and Land Management Act 1984* and the *Wildlife Conservation Act 1950*, of which the latter Act is proposed for replacement with a new *Biodiversity Conservation Act*.

#### *Wildlife Conservation Act*

All native flora in Western Australia are protected under the *Wildlife Conservation Act 1950*. A listing of taxa considered to be rare, in danger of extinction, or in need of special protection is reviewed and gazetted annually as a Schedule under the Act. Gazetted taxa may only be disturbed or impacted in any way with Ministerial Consent. Other taxa which are under consideration for gazettal, but where supporting information is incomplete, and taxa which have recently been removed from the Schedule of Rare Flora are placed on Priority Flora lists.

Of the listed Priority Flora, Priority One taxa are considered the most vulnerable and most in need of further research, whilst Priority Four taxa are those which only require regular monitoring. The Department of Conservation and Land Management (DCLM) maintains these lists.

#### *Environmental Protection Act*

The *Environmental Protection Act 1986* provides for the Environmental Protection Authority (EPA) to prevent, control and abate environmental pollution and to conserve, preserve, protect and enhance, and manage the environment and related matters in Western Australia.

Amendments to the Act are currently being debated in Parliament to determine further protection of native vegetation and clearing controls, to improve impact assessment processes and to provide effective post-approval monitoring of major projects.

#### *Conservation and Land Management Act*

The *Conservation and Land Management Act 1984* was created to make better provision for the use, protection and management of particular public lands and

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waters and the flora and fauna contained within, and to establish authorities to be responsible for the subject lands and related purposes. Information relevant to the project and provided by DCLM who assist the Conservation and Land Management Act Statutory bodies as detailed below:

### Significant Flora

DCLM has compiled a database of Threatened (Declared Rare) Flora, Declared Rare and Priority Species List and the Western Australian Herbarium Specimens.

Previous studies undertaken for the project area by APP (2003) noted that at the time of study, a search of the DCLM databases of known localities for rare and priority flora showed that there were no recorded occurrences within the study area. APP (2003) indicated that two species considered significant at the time of the study and most likely to be found within the study area included the orchid *Diuris micrantha* and a distinctive shrub *Dodonaea hacketiana*.

More recently (July, 2003), a search of the DCLM Threatened (Declared Rare) Flora, Declared Rare and Priority Species List and the Western Australian Herbarium Specimen database was undertaken. DCLM recommended that the database search should encompass an area extending 10km outside the intended survey area. The search identified three Rare, two Priority 1, two Priority 3 and five Priority 4 species as potentially occurring in the project and wider area (Appendix C), however none were plotted as occurring within the project area (Figure 16.). Of these species, *Dodonaea hacketiana* (Priority 4) was plotted closest to the eastern boundary of the site. The increase in species listed as possibly occurring within the site may be explained by the recommended increase in the search area.

The status of the gazetted taxa and those on the priority flora lists changes constantly with further survey and as new information becomes available. For this reason and because the remnants within the project area have not been systematically searched, at subsequent stages of precinct planning within the Proposed Master Plan, updated DCLM database requests and a systematic vegetation and flora survey will be undertaken.

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## Biodiversity

The Environmental Protection Authority (EPA) Position Statements 2: *Environmental Protection of Native Vegetation in Western Australia* (EPA, 2002d) and 3: *Terrestrial Biological Surveys as an element of Biodiversity Protection* (EPA, 2002e) provide guidance for the protection of biodiversity in Western Australia. Position Statement 3 details the EPA's expectation that proponents will ensure that terrestrial surveys of project areas will address both biodiversity conservation and ecological function values and provides further guidance in the form of Draft EPA (2003a) *Guidance Statement No. 51: Terrestrial Flora and Vegetation Surveys for Environmental Impact in Western Australia*.

Guidance Statement No. 51 provides details for planning of timing and level of surveys required, detail as to who should undertake surveys and detail of the types of data that should be collected and presented.

A bilateral agreement regarding biodiversity protection between Western Australia and the Commonwealth has been signed and will come into effect when necessary amendments to the *Environmental Protection Act* 1986 have been passed by the parliament and proclaimed.

## Bush Forever Sites

The *Bush Forever* (Government of Western Australia, 2000) report is the culmination of Perth's Bushplan Project; a long-running initiative which aimed to identify and protect areas of regionally significant bushland and associated wetlands on the Swan Coastal Plain in the Perth Metropolitan Region.

The Proposed Master Plan area does not directly include any *Bush Forever* sites, however the project area is located immediately adjacent to small portions of three *Bush Forever* Sites on the eastern side of the project area (*Bush Forever* Sites 267, 392 and 393). The adjacent *Bush Forever* sites and additional *Bush Forever* sites that lie in close proximity to the project area are listed below and shown in Figure 17. They are:

- *Bush Forever* Site No. 267 – Mandogalup Road Bushland, Hope Valley,

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- *Bush Forever* Site No. 346 – Brownman Swamp, Lake Mt Brown and Adjacent Bushland, Henderson/Naval Base,
- *Bush Forever* Site No. 391 – Thomsons Lake Nature Reserve and Adjacent Bushland, Beeliar, and
- *Bush Forever* Site No. 392 – Harry Waring Marsupial Reserve, Wattleup (adjacent to Site No. 391).
- *Bush Forever* Site No. 393 – Wattleup Lake and Adjacent Bushland. Wattleup/Mandogalup is also located in the eastern proximity of the project area and is designated as ‘Rural Complementary’ by *Bush Forever* mapping. *Bush Forever* Site No. 393 also includes areas designated as ‘Local Town Planning Scheme Reserves’ and ‘Other Government Lands’ (Government of Western Australia, 2000).

*Bush Forever* Sites No. 268 – Mandogalup Road Bushland, Mandogalup, No. 349 Leda and Adjacent Bushland, Leda and No. 269 – The Spectacles are situated further from the project area, to the east and south respectively.

### System 6

Prior to the publication of *Bush Forever*, a study commonly referred to as the System 6 Report (Department of Conservation and Environment, 1983) was produced as part of a series of studies identifying areas of conservation significance within 12 regions (systems) of Western Australia. The recommendations of the System 6 report as made by the Environmental Protection Authority were reviewed and incorporated as part of the *Bush Forever* initiative described above.

Two System 6 areas; M92 Cockburn Wetlands – Western Chain and M93 Cockburn Wetlands – Eastern Chain, are located in proximity to the project area, parts of which are now incorporated within *Bush Forever* Sites 346 and 391/392 respectively. No System 6 areas are located within the project area.

### Existing Environment

The natural vegetation of the Swan Coastal Plain as interpreted from undisturbed remnants and historical records was, in general terms, an almost universal cover of woodlands, shrublands and heath. Within the project area a majority of remnant vegetation has been altered to at least some degree, in some cases as a result of

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extensive development for residential, agricultural/horticultural and industrial uses. Some remnant vegetation in Excellent-Very Good and Very Good condition remains within the project area. Remnants over one hectare in size and with more than 20% of the native cover remaining were mapped by APP (2003) during the preparation of the Proposed Master Plan.

Thirty-one remnants of varying sizes remain distributed throughout the area. Several are not much larger than 1 hectare in extent, but there are also several which are around 20 hectares and larger. Additional areas appear to contain at least scattered trees, but were not mapped as remnant vegetation due to their apparent degree of degradation.

### Vegetation Complexes

Arup (2002) provides the following description of vegetation in the HVWRA. Heddle *et al.* (1980) identified and mapped large scale repeating patterns in native vegetation for the entire Darling System of the south- west of Western Australia. The vegetation was grouped into “Complexes” which reflect the influence of landform, soil type and climate. This work shows the study area as supporting remnants belonging to the Karrakatta Complex – Central and South, and the Cottesloe Complex – Central and South.

Vegetation of the Karrakatta Complex – Central and South is described by Heddle *et al.* (1980) as an open forest of Tuart-Jarrah-Marri, with Jarrah and Marri replacing Tuart as while progressing eastwards. *Banksia attenuata*, *B. menziesii*, *B. grandis* and *Allocasuarina fraseriana* are also common tree species.

The Cottesloe Complex – Central and South is characterised by a closed heath on limestone areas with shrubs such as *Melaleuca huegelii*, *Acacia* species, *Grevillea thelemanniana* and *Trymalium ledifolium*. The deeper sands support a mosaic of Tuart, Jarrah and Marri. *Banksia* species are also common.

All precincts within the project area contain some or all remnant vegetation. Portions mapped (excluding those in completely degraded condition) as Karrakatta Complex Central and South occur within Precincts 3, 4, 6 and 13. Precincts with remnants that lie within the Cottesloe Complex Central and South include 1, 2, 3, 4, 7, 8, 9, 10, 11 and 12.

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Assessments made in 1998 and quoted in *Bush Forever* (Government of Western Australia, 2000) estimated that some 18% and 36% respectively of the original extent of these vegetation complexes remained uncleared at that time. These figures would have included the remnants mapped for the study area, and give an indication of the significance of the remnants.

Approximately 46ha of remnant vegetation in the project area falls within the boundary of the Karrakatta Complex Central and South as mapped by Heddle *et al.* (1980). This amount contributes to approximately 0.007% of the 6275 ha of this complex remaining on the Swan Coastal Plain portion of the Perth Metropolitan Region. *Bush Forever* (Government of Western Australia, 2000) indicates that the Karrakatta Complex Central and South complex has 8% proposed protection, which is under the target 10% for complexes within the Swan Coastal Plain portion of the Perth Metropolitan Region.

### Vegetation Community Types

Work undertaken by Gibson *et al.* (1994) involved the classification of the vegetation of the Swan Coastal Plain using detailed surveys and numerical analysis of the floristic composition of the vegetation. These surveys and subsequent updates have delineated 66 Floristic Community Types. The Gibson *et al.* (1994) study represents the most comprehensive analysis of the vegetation of the Swan Coastal Plain and included an assessment of the conservation and reservation status of the various Community Types.

Vegetation communities within the project area have not been allocated Gibson “Communities”, as this requires detailed survey. APP (2003) note that ‘In many cases, the depauperate condition of the understorey in the remnants would probably not allow for a definitive allocation even after detailed survey’.

However, vegetation survey results from areas included in the Beeliar Regional Park, reported in the Directory of *Bush Forever* Sites, allows the following inferences to be made:

- Wetland Vegetation immediately north of Anketell Road and at Long Swamp is probably representative of ***Community Type 11 – Wet Forests and Woodlands***;

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- Banksia – Jarrah Woodland remnants may belong to *Community Type 21a – Central Banksia attenuata – Eucalyptus marginata woodlands*, or *Community Type 28 – Spearwood Banksia attenuata or Banksia attenuata – Eucalyptus woodlands*;
- The areas of shrublands/heath with or without Tuart may belong to *Community Type 24 – Northern Spearwood shrublands and woodlands* or possibly to *Community Type 26a – Melaleuca huegelii – M. acerosa shrublands of limestone ridges*.

The conservation status of the limestone (last mentioned) communities were both considered to be “susceptible” i.e. “of concern because there is evidence that it can be modified or destroyed by human activities, or would be vulnerable to new threatening processes” in the Gibson *et al.* (1994) report (APP, 2003). The reservation status of these ‘limestone’ communities is Well Reserved and Unreserved for Floristic Community Types 24 and 26a respectively.

#### Threatened Ecological Communities

DCLM has been identifying and informally listing Threatened Ecological Communities (TECs) for the past eight years. The TEC list is derived in part from vulnerable Gibson *et al.* (1994) vegetation communities for the Swan Coastal Plain, and from additional threatened communities throughout Western Australia.

Of the listed TECs, 19 have been endorsed by the Director of Nature Conservation as critically Endangered, 11 as Endangered, 19 as Vulnerable, and two as presumed totally destroyed. The remainder are either awaiting endorsement as threatened or are allocated to one of five priority lists.

As limited survey has taken place at this point, no determination of TECs has been undertaken. Inferences can be made however based on the expected Gibson *et al.* (1994) communities, and from the Floristic Community Types inferred above it appears that there is the potential for Community Type 26a, which is listed on the DCLM TEC database, to occur within the project area. However, in relation to the other inferred community types for the project area (11, 21a, 24 and 28), none are listed on the DCLM TEC database.

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Consequently, because the remnants within the project area have not been systematically searched, detailed surveys will be undertaken to determine the occurrence of TECs within the project area and based on DCLM's updated TEC database at subsequent stages of precinct planning for the Proposed Master Plan.

### Vegetation Condition

None of the remnants in the study area support vegetation that has not been altered in some way. The generally poorer condition compared with nearby conservation areas may be observed from aerial photography (APP, 2003).

Vegetation condition as mapped by APP (2003) using the scale adopted in *Bush Forever* (Government of Western Australia, 2000) for each remnant is shown in Figure 19. An explanation of the six condition categories is given in Table 5.1.

Using the scale in Table 5.1, APP (2003) considered that most remnants in the study area are in "Good" to "Very Good" condition, with some considered to be "Degraded" and a few with dense shrubland/heath on limestone in "Excellent" condition. Determinations of condition were made on the basis that in most cases, the basic vegetation structure remains, with representatives of all the original strata present (i.e. both canopy and understorey etc.).

In cases where the condition was determined "Degraded" it was considered to be primarily due to either grazing or fire completely destroying the understorey, or to alteration of the canopy structure as a result of mining. Shrublands on limestone appear to have escaped grazing damage, and in most cases were 'inimical to human activities' that might have caused significant deterioration. Completely degraded (Category 6) areas were not mapped.



**Table 5.1**  
**Vegetation Condition Rating Scale**  
(after Government of Western Australia, 2000)

Scale	Descriptor	Explanation
1	Pristine	Pristine or nearly so, no obvious signs of disturbance.
2	Excellent	Vegetation structure intact, disturbance affection individual species and weeds are non-aggressive species.
3	Very Good	Vegetation structure altered, obvious signs of disturbance. For example, disturbance to vegetation structure caused by repeated fires, the presence of some more aggressive weeds, dieback, logging and grazing.
4	Good	Vegetation structure significantly altered by very obvious signs of multiple disturbances. Retains basic vegetation structure or ability to regenerate it. For example, disturbance to vegetation structure caused by very frequent fires, the presence of some very aggressive weeds at high density, partial clearing, dieback and grazing.
5	Degraded	Basic vegetation structure severely impacted by disturbance. Scope for regeneration but not to a state approaching good condition without intensive management. For example, disturbance to vegetation structure caused by very frequent fires, the presence of very aggressive weeds, partial clearing, dieback and grazing.
6	Completely Degraded	The structure of the vegetation is no longer intact and the area is completely or almost completely without native species. These areas are often described as “parkland cleared” with the flora comprising weed or crop species with isolated native trees or shrubs.

Factors influencing the condition of the remnants in the study area were considered to be:

- the small size and isolation of remnants;
- past use such as grazing;
- surrounding land uses (agriculture/horticulture);
- proximity of houses leading to uncontrolled access and dumping of rubbish and garden waste; and
- too frequent fires.

### Remnant Vegetation

Larger remnants of vegetation within the project area considered to be important for reasons other than purely remnant vegetation i.e. buffers, specialised fauna habitat, immediately adjacent to *Bush Forever* Sites, potentially part of east-west ecological linkages, potential recreational use (APP, 2003) include:

- the large remnant along Anketell Road at the southern end of the site and associated areas;
- the large remnant close to the eastern edge of the study area which may also form part of an east-west linkage along the planned extension of Rowley Road; and
- all remnants abutting Russell Road.

A table showing the extent of remnant vegetation (excluding Completely Degraded condition) within the project area is shown in Section 5.1.4.

### Conservation Areas - Regional

Regional conservation areas in proximity to the project area include areas of the Beeliar Regional Park, which abut the study site for most of its length along the western boundary, and lie close to the boundary on the east (Figure 17). The Beeliar Regional Park was established primarily to protect and conserve the wetlands and associated vegetation and fauna assemblages in what are known as the eastern and western chains of the Cockburn Wetlands. Wetlands situated closest to the study site are the Brownman Swamp and Lake Mt Brown immediately to the west, and Thomsons Lake and Banganup Lake to the east.

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Much of the Beeliar Regional Park has high conservation value due to its rich diversity and complexity of ecosystems which are limited in distribution across the Swan Coastal Plain. APP (2003) considers that even though the wetlands within the Park are by no means pristine, they form one of the most important systems of wetlands remaining with the Perth Metropolitan Region (Conservation Commission of Western Australia, 2001).

In addition to these conservation areas, selected areas of vegetation of regional significance outside of the HVWRA area have been incorporated within *Bush Forever* Sites (Government of Western Australia, 2000), as detailed earlier in this section.

### Existing Linkages

The creation or enhancement of ecological linkages is one of the important environmental opportunities provided by the development proposals for the HVWRA.

The strategic plan for Perth's Greenways (Tingay and Associates, 1998) identified Russell Road as a link between Thomsons Lake and Woodman Point on the coast, and Stock Road (Rockingham Road) as a connection between the Brownman Swamp and Lake Mt Brown and Lakes Cooloongup and Walyungup to the south (Figure 20).

A further opportunity to maintain vegetation for an east – west connection, between Thomsons Lake and the Lake Mt Brown bushland areas is presented by the road reserve of the proposed extension of Rowley Road from the Kwinana Freeway to the coast. Consideration will be given to widening the road reserve to enable appropriate and viable revegetation and the retention of any native vegetation remnants along this link at the precinct planning stage.

The Town of Kwinana has developed and adopted additional proposals to the Strategic Greenways. Of particular significance to the Proposed Master Plan are the ecological linkages proposed by the Town of Kwinana which include the remnant bushland along Anketell Road, Long and Conway Road Swamps, and the remnant bush adjacent to Hendy Road (Figure 20). As part of this proposal the Town has recently agreed with Alcoa that a wide remnant of the Alcoa land north of Anketell Road to the east of the study site will be preserved as part of an east-west linkage.

The benefits of this proposal are outlined within Section 5.1.5.

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### Wetland Associated Vegetation – Dryland Buffers

The Hill *et al.* (1996) 200m “zone of secondary influence” buffers for wetlands within the project area are currently contained within Precincts 1 and 14 (Long Swamp, Hendy Road Swamps, Conway Road Swamp), Precinct 2 (Conway Road Swamp) and Precinct 3 (for Long Swamp). Buffers for wetlands that lie beyond the eastern extent of the site are contained within Precincts 6 and 13.

Buffer requirements are dependent on the wetland management category as defined by the Department of Environment as discussed in Section 5.3. Revegetation of wetland buffers relevant to Specially Protected Fauna is discussed in Section 5.2.5.

#### 5.1.4 Potential Impacts

Previous mapping of remnant vegetation (Arup, 2002) shows that at least small pockets of vegetation occur in each of the 14 precincts (Figure 19). The most significantly sized portions of vegetation remain in Precincts 1, 12, 11, 9, 6, 13 and 3 respectively.

Of all the remnant vegetation in the project area, the APP (2003) assessment noted that most were in “Good” to “Very Good” condition with some considered to be “Degraded” and a few with dense shrubland/heath on limestone in “Excellent” condition.

The Proposed Master Plan shows potential land uses within each of the precincts impacting on existing remnant vegetation as summarised in Table 5.2.

**TABLE 5.2**  
**Remnant Vegetation Affected by Potential Land Uses**

Precinct	Intended Potential Land Use	Existing Remnant Vegetation* (ha) Within each Precinct	Vegetation* (ha) within Proposed Parks and Recreation Reserves	Vegetation* (ha) Subject to Further Environmental Investigation (1)	Resultant Area of Vegetation* (ha) Potentially Impacted by Development
1	General industrial area, bulk goods handling	77.7	12.48	49.83	27.87
2	Transport industry area, bulk goods handling and freight industries	2.31	0	1.02	1.29
3	General Industry	46.38	0	3.46	42.92
4	Major transport hub, containerisation, warehousing and transport depots	7.89	4.86	6.81	1.08
5	Commercial service centre	0	0	0	0
6	Low intensity business park	18.84	0	0.82	18.02
7	Central transport area	3.96	0	0.05	3.91
8	Resource recovery industries	5.84	0	0.04	5.8
9	Eco-industrial Development, new products through environmental technologies	14	0	0	14
10	General Industrial purposes	3.62	0	0	3.62
11	General Industry, large scale retail, commercial warehousing adjacent to residential areas	36.16	0	0.32	35.84
12	Entry point, business park development, marine and boat building industries	12.1	0	12.1	0
13	To be determined	14.92	0	0	14.92
14	Preservation of Long Swamp	16.09	16.09	16.09	0
<b>Total</b>		259.81	33.43	90.54	169.27

\*Excluding Vegetation in Completely Degraded condition

(1) Refer to Figure 21 and Appendix E for further detailed information



Predominant impacts on vegetation (excluding vegetation in Completely Degraded condition) as a result of proposed land uses in the project area include:

- removal of vegetation within remnants in Precincts 9, 10, 11 and 12 along Russell Road which will impact on the potential for a future east-west linkage between Thomsons Lake, and Brownman Swamp;
- removal of vegetation within remnants in Precincts 4 and 6 and a portion of vegetation in Precincts 3 and 5, which may form part of a future east-west corridor within the proposed Rowley Road extension. Vegetation in Precincts 3, 4, 6 and 13 contains vegetation mapped by Heddle *et al.* (1980) as Karrakatta Complex - Central and South vegetation complex, which is under the target 10% retention levels for complexes within the Swan Coastal Plain portion of the Perth Metropolitan Region;
- removal of other varying sized pockets of remnant vegetation in Precincts 2, 3, 4, 7, 8, 9, 10 11 and 12;
- Removal of vegetation in Precinct 1 which acts as ecological linkages between Long Swamp, Hendy Road Swamps and Conway Road Swamp;
- removal of remnant vegetation in the Cottesloe Complex Central and South, of which 18% is proposed for retention, which is above the 10% retention target for complexes within the Swan Coastal Plain portion of the Perth Metropolitan Region; and
- removal of remnant vegetation that may contain Floristic Community Type 26a – *Melaleuca huegelii* – *M. acerose shrublands on limestone ridges*, which is listed on the DCLM TEC Database.

The HVWRP Planning Policies consider impacts on remnant vegetation within selected precincts:

### **Precinct 1: Southern Industrial**

This area also abuts and includes existing wetland areas and high-quality remnant vegetation (northern boundary).

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### **Precinct 3: Long Swamp Industrial**

Consideration needs to be given to the proximity of Long Swamp and the “view shed” corridors from Long Swamp north to this precinct; and

Careful consideration needs to be given to matters of potential environmental impact on Long Swamp, particularly stormwater management. In this regard, the Commission will be particularly discerning in respect of the suitability of certain uses locating in close proximity to the swamp.

### **Precinct 5: Wattleup / Commercial**

Consideration in terms of future land use and development will also need to be given to the proximity of the precinct to the Beeliar Regional Park on the western side of Rockingham Road and the associated wetlands within, most notably Lake Mt Brown.

### **Precinct 7: Northern Transport**

Consideration in terms of future land use and development will also need to be given to the proximity of the precinct to the Beeliar Regional Park on the western side of Rockingham Road and the associated wetlands within, notably Brownman Swamp and Lake Mt Brown.

### **Precinct 8: Resource Recovery**

Consideration in terms of future land use and development will also need to be given to the proximity of the precinct to the Beeliar Regional Park on the western side of Rockingham Road and the associated wetlands within, most notably Brownman Swamp.

### **Precinct 9: North-East Gateway**

The precinct contains a large area of remnant vegetation to the north (future extraction site), and;

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As with the other eco-industrial precincts, development should achieve positive and sustainable environmental outcomes.

#### **Precinct 10: Russell Road Industrial**

Consideration in terms of future land use and development will need to be given to the proximity of the precinct to the Beeliar Regional Park on the western side of Rockingham Road and the associated wetlands within, most notably Brownman Swamp.

#### **Precinct 11: Northern Industrial**

Pockets of remnant vegetation exist within the precinct; wherever possible, development form should respond to existing topography, and should endeavour to retain remnant vegetation original to the landscape character of the precinct.

The precinct should be afforded increased amenity through the retention of remnant vegetation and related open space where possible, and improved connections to similar areas.

#### **Precinct 12: Northern Gateway**

A large part of the site is covered by remnant vegetation, with the highest quality areas adjoining the western boundary of the precinct. The context of the precincts location is characterised by residential areas to the north, Henderson and Jervoise Bay marine related centres to the west, and Brownman Swamp and Beeliar Regional Park to the south-west.

Additionally, the precinct should be afforded increased amenity through the retention of remnant vegetation and related open space where possible, and improved connections to similar areas.

#### **Precinct 13: To be determined**

The precinct is characterised by a large number of rural living blocks and abuts wetlands to the northeast.

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Existing landform and the retention of vegetation should also be considered as part of any new development.

### **Precinct 14: Long Swamp**

This precinct includes land covered by Long Swamp, a natural depression forming a drainage collection area. It is intended the precinct be maintained in terms of existing vegetation and landscape character, and enhanced to protect the habitat value of the area and provide the opportunity for a range of recreational uses.

Future subdivision of land within this area is not contemplated. Given the regional significance of the Long Swamp and associated wetlands, land within the precinct should be acquired and reserved. Any appropriate development in association with the intentions for the precinct should be low in scale with an underlying conservation focus. Educational use, habitat management and enhancement through replanting of native vegetation are envisaged within the precinct.

#### Potential Rowley Road extension

The extension of Rowley Road to the coast, while providing potential for an area for an ecological link between the eastern and western boundaries of the project area, may impact on pockets of vegetation remaining in precincts 3, 4, 5, 6 and potentially 13 as mentioned above.

The alignment of the proposed extension of Rowley Road is under review by DPI and extends beyond the western boundary of the Proposed Master Plan area and is not subject to this Environmental Review.

The extension of Rowley Road raises potentially significant issues outside the study area. Issues include potential impacts on *Bush Forever* Sites 346 and 393. A separate Environmental Impact Assessment procedure may apply should extension outside the study area be pursued.

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### 5.1.5 Proposed Management

The management of flora and vegetation issues both within the project area and external to the site is important to avoid adverse impacts to the environment, and to ensure the protection of and enhancement of the ecological values of the area.

There is a need to consider important ecological linkages and incorporation of remnant vegetation and to protect the native flora of the area at each stage of planning. In order to achieve this objective, the Proposed Master Plan has acknowledged the issue in its overriding environmental objectives for the Proposed Master Plan:

From Section 7.1 of the Proposed Master Plan:

*It is intended that land in the Master Plan be developed in accordance with best known environmental practice, as follows.*

- (c) The use or development of land is to not have individual or cumulative adverse environmental or social impacts on:*
- *Conservation Category Wetlands or any sensitive environments within or outside of the Redevelopment Area.*

Section 7.2 of the Proposed Master Plan forms the basis of the management system to achieve the above objectives.

#### Section 7.2 - Environmental Objectives

*Land in the Redevelopment Area is intended to be developed and managed in such a manner as to:*

- (a) prevent any potential adverse environmental impacts, including those related to health and amenity, extending beyond the Redevelopment Area;*
- (c) support the protection of sensitive environments and areas of environmental significance within and outside the Redevelopment Area, including Beeliar wetlands, Cockburn Sound, Long Swamp and Bush Forever sites;*

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- (l) *maintain and or enhance linkages between fauna habitats and vegetation communities - such as remnant vegetation, reserves and wetlands - to facilitate connectivity, accessibility and interaction of species;*
- (m) *implement and support environmental best practice;*
- (q) *prevent unacceptable levels of individual, societal or environmental risk;*
- (u) *optimise development potential in an environmentally acceptable way.*

In addition to the Proposed Master Plan the Planning Strategy for the HVWRP provides a long-term framework for the development. The purpose of the strategy is to ensure a comprehensive approach to the planning and development of the Hope Valley-Wattleup area and environs, setting the parameters for more detailed planning.

Section C2.4.3 of the Proposed Master Plan Report outlines the Environmental Strategy which includes a number of actions and items relating to improving the quality of the receiving environment and vegetation on a Precinct basis:

- Redevelopment must maintain and or enhance linkage between vegetation community and fauna habitats, such as remnant vegetation, reserves and wetlands, to facilitate connectivity, accessibility and interaction of species.
- Support the protection of sensitive environments and areas of environmental significance within and outside the project area, such as Beeliar wetlands, Cockburn Sound and *Bush Forever* Sites.
- Large or quality pockets of remnant vegetation, including those along transport corridors (i.e. road reserves) have been retained.
- Large portions of significant remnant vegetation will be retained, and must be maintained and enhanced as habitat corridors, greenbelts, parks and recreational areas.
- These corridors, which support native vegetation, must be rehabilitated through revegetation, structured planting, landscaping and irrigation.

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- Redevelopment must maintain and/or enhance linkage between vegetation community and fauna habitats, such as remnant vegetation, reserves and wetlands, to facilitate connectivity, accessibility and interaction of species.

In addition to the measures proposed within the Proposed Master Plan planning process, Section 7.4.1 of the Proposed Master Plan refers to the provision of environmental information as follows that may be made at the development application level:

Section 7.4.1

*An applicant shall submit sufficient information to enable the Commission to assess each application in accordance with the Statement of Environmental Intent, the Environmental Objectives, the Environmental Development Requirements, the other environmental provisions of this Part and all relevant standards and legal requirements and show how these will be met.*

The information required to be provided to the Commission under clause 7.4.1 shall include the following:

- (a) Information on the receiving biophysical environment following survey in accordance with EPA (2003) Draft Guidance No. 51 and 56 and any significant features or characteristics, in both a local and regional context;*
- (m) Demonstration of how significant environmental areas such as wetlands, habitat corridors, remnant vegetation, reserves and conservation areas are to be protected;*
- (n) Promotion of existing vegetation retention, revegetation, landscape enhancement and visual aesthetics;*
- (o) Management plans and commitments for the minimisation or protection of any significant environmental factors, impacts or issues including a review of the Town of Kwinana's Draft Revegetation Management Plan for Long Swamp.*

Environmental Objectives 7.2 (l) and (m) are addressed through proposed 'Green Belts and Habitat Corridors Preserved for Conservation and Enhancement' for the

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Proposed Master Plan area, and opportunities for potential Greenways linkages as recommended by Town of Kwinana (Figure 21) with provision for vegetation retention, revegetation and maintenance of ecological links as follows:

- Retention of wetlands and vegetation in Precinct 14 (Long Swamp);
- Retention of vegetation in Precinct 1, which includes Conway Road Swamp and an east-west linkage of upland vegetation from Conway Road Swamp east to the proposed Fremantle-Rockingham Highway road reserve;
- Other significant “green links” and additional areas of remnant vegetation have also been identified as having potential for conservation. This potential will be pursued at the precinct planning stage subject to further environmental investigations;
- Consider retention of an east-west vegetated linkage extending on from the proposed Fremantle-Rockingham Highway road reserve to the Hendy Road Swamps, with a vegetated north-south linkage to Long Swamp, as part of the Town of Kwinana Greenways linkages to be considered at the precinct planning stage;
- Retention of vegetation along Wattleup Road in Precinct 4;
- Consideration of the retention of vegetation bordering Precinct 12 (encompassing the Cockburn Cement works) and linking Fancote and Rockingham Roads at the precinct planning stage;
- Consideration of a corridor for revegetation bordering Precincts 8, 9 and 10 and linking Russell and Rockingham Roads and linking Thomsons Lake and Brownman Swamp and associated *Bush Forever* Sites at the precinct planning stage;
- Consideration of retaining pockets of vegetation in Precinct 3 at the precinct planning stage.

Consequently, the following factors are ensured:

- the potential to retain a diversity of native vegetation types at the precinct planning stage;
- the potential to preserve fauna habitat identified as being of particular significance to fossorial vertebrates at the precinct planning stage;

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- protection of Long Swamp, Conway Road Swamp and Hendy Road Swamps;
- the protection of an east-west corridor of upland vegetation east from Conway Road Swamp;
- the potential to maintain linkages between two local wetland systems, and potential linkages to large conservation areas at Lake Mt Brown, the Spectacles and Thomsons Lake at the precinct planning stage;
- provide potential for passive recreation areas in the remnant bush near Hendy Road, Postans Cottage and the de San Miguel Home;
- preservation of the historic site along Hendy Road (Old Hope Valley School Site), and
- provision of an effective visual buffer between the Motorplex site to the south and any new development.

The Town of Kwinana has developed and adopted additional proposals to the Strategic Greenways. Of particular significance to the Proposed Master Plan are the ecological linkages proposed by the Town of Kwinana which include the remnant bushland along Anketell Road, Long Swamp, Conway Road Swamps and the remnant bush adjacent to Hendy Road (Figure 20) within Precincts 1 and 14. As part of Strategic Greenways proposal the Town has recently agreed with Alcoa that a wide remnant of the Alcoa land north of Anketell Road to the east of the study site will be preserved as part of an east-west linkage.

Retention of Long Swamp, the Hendy Road Swamps and Conway Road Swamp (as highlighted in Figure 21) will help promote the Town of Kwinana's Proposed Ecological Links. Furthermore, retention of bushland between all three swamp areas will help maintain and enhance Specially Protected Fauna (Quenda) habitat.

Where practicable during future stages of the planning process, the following options to enhance the ecological linkages in the area will be considered:

- retaining remnant vegetation abutting Russell Road in Precincts 9, 10 11 and 12 to maintain and promote east-west linkages through the project area, particularly between Thomsons Lake and Brownman Swamp;

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- retaining portions of larger remnants close to the eastern edge of the HVWRA in Precincts 6 and 13 which form part of a potential east-west linkage along the planned extension of Rowley Road. The HVWRP Planning Policy states that retention of vegetation should be considered as part of any new development. Consideration will also be given to widening the road reserve along the length of the planned Rowley Road extension to increase the area of viable ecological link.
- retaining vegetation in Precinct 1 linking the Conway Road Swamp in the west with the Hendy Road Swamp in the east, and north to Long Swamp, as part of the Town of Kwinana Greenways linkages;

Ensuring retention of remnant vegetation and ecological linkage areas will also assist in sedimentary and erosion control of surface water, as well as mitigating water retention and infiltration.

Additional management measures that may be undertaken at Structure Plan level are detailed below.

#### Long Swamp, Hendy Road Swamps and Conway Road Swamp

A Draft Revegetation Management Plan has been prepared for Long Swamp by the Town of Kwinana and will be reviewed. Surveys of wetlands in the proximity of the project area may be undertaken to assess vegetation diversity and structure to aid in the planning of revegetation of Long Swamp, and the Hendy and Conway Road Swamps. Vegetation of particular importance to the Quenda (Section 5.2.5) will be a focus in revegetation works in Precincts 1 and 14.

Informative signage will be constructed to educate the public about ecological processes, flora and fauna in the Long Swamp area.

#### Survey Prior to Development

Environmental Objective 7.4.2 (a) of the Proposed Master Plan refers to submission of information to the Commission related to a development application. As limited survey of each remnant has been undertaken, further detailed surveys will be undertaken at the precinct structure plan level, prior to detailed planning for

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development. Surveys will be undertaken based on Draft EPA Guidance Statement No. 51 (EPA, 2003a) described earlier in this report (Section 5.1.3).

Surveying each Precinct separately will allow vegetation condition to be taken into account and enable planning of development locations within each precinct to enhance linkages and significant environmental areas.

Further survey will also allow for:

- searches to be undertaken based on updated DCLM Declared Rare and Priority Flora species based on updated DCLM lists; and
- determination of any TECs within the project area based on DCLM's updated TEC database.

### Landscaping

Environmental Objective 7.4.2 (n) of the Proposed Master Plan refers to the promotion of landscape enhancement. HVWRP Planning Policy 1.3 adequately manages provisions for plant selection with respect to street plantings and landscaping, and water saving landscapes. Consultation with relevant professionals will be undertaken to ensure the ongoing sustainability and enhancement of landscaping works within the project area.

### Environmental Management

The location of the HVWRP within an area encompassed by regional parks and adjacent *Bush Forever* sites provides significant opportunity for the retention of remnant vegetation within the project area and to provide important ecological linkages to flora and fauna and resultant biodiversity across the site.

As part of the project area's development there is also the opportunity to create heritage and conservation areas associated with the wetlands, significant areas of remnant vegetation and isolated heritage sites. This opportunity will help promote and conserve heritage values in the area if managed appropriately.

Potential ecological linkages including those identified for the strategic plan for Perth's Greenways, for the southern wetlands, Russell Road and the proposed Rowley

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Road extension, and potential widening of the associated road reserve, would ensure that crucial buffers between development areas and transport corridors, and the environment. This would also provide protection from developmental pressures for environmentally sensitive areas such as Beeliar Regional Park.

#### 5.1.6 Proposed Outcome

With the use of environmentally sensitive planning and development using the principles underlying the HVWRP, management strategies within the Proposed Master Plan and legislative management capabilities, there is the ability to meet Proposed Master Plan objectives and provide environmental enhancement within the HVWRA.

Consequently, with due regard to the planning principles underlying the HVWRP, the proposed provisions within the Proposed Master Plan and legislative environmental management capabilities, the EPA's objective for the Flora factor is able to be met.

### **5.2 Fauna**

#### 5.2.1 Preliminary EPA Objective

To maintain the abundance, diversity, geographic distribution and productivity of fauna at species and ecosystem levels through the avoidance or management of adverse impacts and improvement in knowledge.

#### 5.2.2 EPA Scope of Work

*How will the values associated with native fauna and fauna habitat in the scheme area be protected?*

Describe the fauna likely to be found, and fauna habitats. Clarify the extent of any biological research carried out.

Discuss the values and significance of the scheme area with respect to the factor "fauna", the potential for threatened fauna and other species of interest, and any existing and potential habitat linkages.

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Identify any existing issues related to the fauna of the scheme area, and any potential issues that may arise from the implementation of the scheme.

Describe the scheme measures to address the protection of fauna and fauna habitat. Are there any linkages incorporating remnant vegetation? Are there any revegetation/landscaping requirements? Indicate the processes for further consideration of native fauna at each stage of planning.

### 5.2.3 Existing Environment and Policies

A range of legislation is relevant to biodiversity conservation in Western Australia, including the *Environmental Protection Act 1986* (EP Act), the *Conservation and Land Management Act 1984* and the *Wildlife Conservation Act 1950*, of which the latter Act is proposed for replacement with a new *Biodiversity Conservation Act*.

#### Wildlife Conservation Act

Animals species listed under Section 14 (2) (ba) of the *Wildlife Conservation Act 1950* are considered to be Specially Protected Fauna. The latest listing is the Wildlife Conservation (Specially Protected Fauna) Notice 2003 (Government of Western Australia, 2003).

Priority Fauna are species of Conservation Significance listed by DCLM's Threatened Species Consultative Committee but which are not currently listed under Section 14 (2) (ba) of the *Wildlife Conservation Act 1950* as Specially Protected Fauna, of which a potential listing for the project area is shown below.

#### Biodiversity

The *Commonwealth Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) applies to proposed actions which have the potential to significantly impact on a matter of national environmental significance. In such cases the proposed action is referred to the Commonwealth Minister for the Environment for a decision on whether assessment is required under the provisions of the Act.

The species *Calyptorhynchus latirostris* (Carnaby's Black Cockatoo) which is listed by DCLM as Specially Protected Fauna under the *Wildlife Conservation Act 1950* is

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also listed as an Endangered species of national environmental significance under the EPBC Act. Therefore any proposed action that may have a significant impact on this species within the Proposed Master Plan area will be subject to referral to the Commonwealth Minister for the Environment.

EPA Position Statement No. 3 (2003b), *General Requirements for Terrestrial Biological Surveys for Environmental Impact Assessment in Western Australia*, argues for the establishment of a consolidated database of data collected during terrestrial vertebrate fauna surveys. A workshop for the above Position Statement, independent of the Proposed Master Plan process, addressed the following issues:

- the need for an appropriate terrestrial vertebrate fauna survey database;
- the elements and protocol for an appropriate terrestrial vertebrate fauna survey database;
- other biological databases (e.g. soils and vegetation) that need to be linked to, or considered in the development of a terrestrial vertebrate fauna database; and
- a method of managing a database

Guidance for Biodiversity Protection in Western Australia is provided in the form of EPA (2003b) *Draft Guidance No. 56: Terrestrial fauna surveys for environmental impact assessment in Western Australia*. The Guidance Statement gives details for planning of timing and level of fauna survey required, detail as to who should undertake surveys and detail of the types of data that should be collected and presented.

#### Wetlands and Birds of International Significance

The 1971 Convention on Wetlands of International Importance (Ramsar Convention) and JAMBA and CAMBA agreements covering migratory birds, between Australia and Japan and China respectively apply to the protection of biodiversity in Western Australia.

None of the wetlands within the project area are recognised as the above wetlands of importance, however Hill *et al.* (1996) classifies Thomsons Lake (to the east of the project area, in *Bush Forever* Site No. 391) as a wetland of international importance nominated for inclusion under the Ramsar Convention (see also Section 5.3.3). Fauna

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protection under this agreement should be taken into consideration as the extent of species usage within the Proposed Master Plan area is yet to be confirmed.

### Protected Fauna

The Department of Conservation and Land Management has compiled a Threatened Fauna database, which includes species which are declared as ‘Rare or likely to become extinct (Schedule 1)’, Birds protected under an international agreement (Schedule 3)’, and ‘Other specially protected fauna (Schedule 4)’.

DCLM also maintains a supplementary or priority list of fauna taxa, whereby taxa are designated into four Priority Levels (P1 – P4), with Priority one species (P1) being the most significant. 17 Significant Bird species as listed in Table 15 in *Bush Forever* (Government of Western Australia, 2000) were listed by a Museum Database Search for the project area and further 10km extent, and are indicated in Appendix D.

A recent DCLM database search for the project area, and a further 10km boundary as recommended by DCLM, provided the following list:

#### Schedule 1 – Rare or is likely to become extinct

*Myrmecobius fasciatus* (Numbat)

This diurnal marsupial feeds almost exclusively on termites and is very vulnerable to predation by foxes and cats. It occurs in a variety of habitats including woodland and shrubland where it shelters in hollow logs, tree hollows and burrows.

*Calyptorhynchus latirostris* (Carnaby’s Black Cockatoo)

This species moves around seasonally in flocks to feeding area in proteaceous scrubs and heaths and eucalypt woodlands as well as pine plantations. Breeding occurs in winter/spring, mainly in the eastern forests and wheatbelt where they can find mature hollow-bearing trees to nest in.

#### Schedule 4 – Other specially protected fauna

*Falco peregrinus* (Peregrine Falcon)

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This species is uncommon and prefers areas with rocky ledges, cliffs, watercourses, open woodland or margins with cleared land.

#### Priority One

*Throscodetes xiphos* (Throscodectes xiphos)

This species of Tettigoniid cricket is known only from the Cutler Road area in Jandakot. Life history and habits are unknown. Possible threats include clearing for housing and altered fire regimes.

#### Priority Four

*Isoodon obesulus fusciventer* (Quenda)

This species prefers areas with dense understorey vegetation, particularly around swamps and along watercourses, that provides ample protection from predators.

*Macropus irma* (Western Brush Wallaby)

This species occurs in areas of forest and woodland supporting a dense shrub layer.

*Falsistrellus mackenziei* (Western False Pipistrelle)

This species of bat occurs in high rainfall jarrah forest and coastal woodlands. It roosts in small colonies in tree hollows and forages in the cathedral-like spaces between trees.

*Charadrius rubricollis* (Hooded Plover)

This species frequents the margins and shallows of salt lakes, also along coastal beaches, where they forage for invertebrates along the water's edge.

The schedule one species *Calyptorhynchus latirostris* (Carnaby's Black Cockatoo) is listed as Endangered under the EPBC Act (*Environment Protection and Biodiversity Conservation Act 1999*).

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No fauna survey of the HVWRA has been undertaken as part of this study, however a general list of expected species for the project area was provided by the Western Australian Museum. The list includes threatened and non threatened fauna, native and introduced species for the project and wider area (encompassing approximately 28,500ha including the adjacent *Bush Forever* Sites containing Thomsons Lake, Brownman Swamp and Lake Mt Brown areas).

The Museum list includes 67 birds, 49 reptiles and amphibians and 14 mammals (Appendix D). Of the area encompassed by this list, approximately 1,426ha is contained within the project area, of which 235ha is existing vegetation, 165 ha of which is likely to be impacted as a result of planned land uses.

APP (2003) noted the dependence of native fauna on scattered bushland throughout the metropolitan area around Perth; since the mid 1990s there has been a concerted effort to document the significance of remnants of native vegetation on the maintenance of vertebrate biodiversity on the Swan Coastal Plain (How and Dell, 2000).

The results of the study by How and Dell (2000), along with historical records indicates that the impact of development and increased urbanisation has been most marked on the mammalian fauna with impacts also on some groups of bird species. Reptiles appear to have been least affected by habitat loss and fragmentation.

Of relevance to the current study area is the finding that there are high numbers of reptile species on the near coastal landforms of the Swan Coastal Plain. This makes the retention of remnants of natural vegetation on the Quindalup/Spearwood landform units a priority for maintaining populations and assemblages of the rich fossorial reptile groups that are a feature of these dune systems.

Also of significance may be the breeding habitat provided by Long Swamp for waterbirds. Although there are numerous large wetland areas in the region, it has been suggested by Bamford (2001) that small, diverse wetland systems may be disproportionately significant as breeding sites for some waterbirds.

Of the fauna now deemed to be threatened or in need of special protection known from the Metropolitan area, the Quenda (Southern Brown Bandicoot) is the only one which may possibly be present within the study area. This species is generally

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associated with dense low-lying vegetation such as that in an around the wetlands at the southern end of the project area. It has been recorded from all of the nearby *Bush Forever* Sites (Government of Western Australia, 2000). The Quenda is currently listed on the DCLM's lists of Priority fauna as being in need of special protection (Priority 4), but is not a Schedule species.

#### 5.2.4 Potential Impacts

Predominant impacts to fauna as a result of proposed land uses in the project area are directly related to impacts on vegetation as described in Section 5.1.4, and include removal of existing vegetation remnants and hence habitat:

- removal of vegetation within remnants in Precincts 9, 10, 11 and 12 along Russell Road which may impact on the potential east-west linkage between Thomsons Lake and Brownman Swamp;
- removal of vegetation within remnants in Precincts 4 and 6 and a portion of vegetation in Precincts 3 and 5 which may form part of an ecological east-west corridor within the proposed Rowley Road extension;
- removal of other varying sized pockets of remnant vegetation in Precincts 2, 3, 4, 7, 8, 10, 11 and 12; and
- Removal of vegetation in Precinct 1 which acts as ecological linkages between Long Swamp, Hendy Road Swamps and Conway Road Swamp.

Impacts to protected fauna that may be expected to exist within the project area include potential development within the proposed buffer of the wetlands beyond the eastern extent of Precinct 13 which may be of significance to the Quenda. Potential impacts to other protected fauna include clearing of vegetation that may contribute to fauna habitat.

#### 5.2.5 Proposed Management

The management of fauna issues both within the project area and external to the site is important to avoid adverse impacts to the environment and to ensure the protection of and enhancement of the ecological values of the area.

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There is a need to consider important ecological linkages and incorporation of remnant vegetation in order to protect the native fauna of the area at each stage of planning. In order to achieve this objective the Proposed Master Plan has acknowledged the issue in its overriding environmental objectives for the Proposed Master Plan:

From Section 7.1 of the Proposed Master Plan:

*It is intended that land in the Redevelopment Area be developed in accordance with best known environmental practice, as follows.*

- (c) *The use or development of land is not to have individual or cumulative adverse environmental or social impacts on:*
- *Conservation Category Wetlands or any sensitive environments within or outside of the Redevelopment Area.*

Section 7.2 of the Proposed Master Plan forms the basis of the management system to achieve the above objectives. Objectives related to the protection of flora and vegetation and the subsequent fauna habitat are detailed in Section 5.1.5 of this report and are not repeated. Objectives relating to fauna issues are:

*Section 7.2 - Environmental Objectives*

*Land in the Redevelopment Area is intended to be developed and managed in such a manner as to:*

- (l) *maintain and or enhance linkages between fauna habitats and vegetation communities - such as remnant vegetation, reserves and wetlands - to facilitate connectivity, accessibility and interaction of species.*

In addition to the Proposed Master Plan, the HVWRP Planning Strategy provides a long-term framework for the development. Section C2.4.3 of the Proposed Master Plan Report outlines the Environmental Strategy which includes a number of actions and items relating to improving the quality of the receiving environment and vegetation (and resultant fauna habitat) on a Precinct basis, as discussed in Section

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5.1.5 of this Environmental Review. Environmental Planning Strategies directly related to fauna are outlined in the Proposed Master Plan Report at Section C2.4.3:

- *Redevelopment must maintain and or enhance linkage between vegetation community and fauna habitats, such as remnant vegetation, reserves and wetlands, to facilitate connectivity, accessibility and interaction of species.*

Of the fauna now deemed to be threatened or in need of special protection known from the metropolitan area, (APP, 2003) suggest that the Quenda (Southern Brown Bandicoot) may be the most likely to inhabit vegetation in the project area.

The species is generally associated with dense low-lying vegetation such as that found in an around the wetlands at the southern end of the study site. Consequently, the retention of Long Swamp (Precinct 14) as a potential breeding habitat for water birds, and around the other smaller wetlands in the south of the project area (Precinct 1), is important, as provided for in Section 7.2 of the Proposed Master Plan:

Section 7.2 - Environmental Objectives

*Land in the Redevelopment Area is intended to be developed and managed in such a manner as to:*

- (c) *support the protection of sensitive environments and areas of environmental significance within and outside the Redevelopment Area, including Beeliar wetlands, Cockburn Sound, Long Swamp and Bush Forever sites;*
- (l) *maintain and or enhance linkages between fauna habitats and vegetation communities - such as remnant vegetation, reserves and wetlands - to facilitate connectivity, accessibility and interaction of species.*

Survey Prior to Development

In addition to the measures proposed within the Proposed Master Plan planning process, Section 7.4.1 of the Proposed Master Plan refers to the provision of environmental information as follows that may be made at the development application level:

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The information required to be provided to the Commission under clause 7.4.1 shall include the following:

*(a) Information on the receiving biophysical environment after survey in accordance with EPA Draft Guidance No. 51 and 56 and any significant features or characteristics, in both a local and regional context;*

Monitoring after completion of development will be considered to assess success of proposed ecological corridors and wetland revegetation (Long Swamp) and to undertake further management if necessary.

#### 5.2.6 Proposed Outcome

Environmentally sensitive development, management strategies and planning principles underpin the HVWRP. Ensuring the protection and the conservation of native fauna within or near the HVWRA, remnant vegetation and retention of habitat corridors and ecological linkages will enhance the landscape, biodiversity and ecological functions of the area in accordance with EPA objectives.

Consequently, with due regard to the planning principles underlying the HVWRP, the proposed provisions within the Proposed Master Plan and legislative environmental management capabilities, the EPA's objective for the Fauna factor is able to be met.

### **5.3 Wetlands**

#### 5.3.1 Preliminary EPA Objective

To maintain the integrity, ecological functions and environmental values of wetlands.

#### 5.3.2 EPA Scope of Work

*How will the values of wetlands in and adjoining the scheme area be protected?*

Identify the wetlands in and adjoining the scheme area eg Long Swamp, their buffers and catchments, and management category.

Discuss how the wetlands may be affected, and issues relating to wetlands.

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Discuss scheme measures, and any other planning measures proposed to protect the wetlands in and near the scheme area.

### 5.3.3 Existing Environment and Policies

The site is relatively well drained by both surface and subsurface processes as a result of porous surface soils. However in isolated areas where topography is low, wetlands occur as surface expressions of the local unconfined aquifer (groundwater table), and therefore may be connected by groundwater on a regional basis.

The Swan Coastal Plain Wetland Atlas (Hill *et al.*, 1996) published by the WRC, delineates and maps the wetland types and condition of all known wetlands on the Swan Coastal Plain, and also assigned one of three management categories based on relative environmental attributes.

The WRC's Position Statement on Wetlands provides a general description and management objectives for each of the three different management categories for wetlands: Conservation, Resource Enhancement and Multiple Use (Table 5.3).

Wetlands occur within the southern portion study area, with four located immediately adjacent (i.e. within the Hill *et al.* (1996) 200m "Zone of Secondary Influence") to the study area (Figure 18). The Hill *et al.* (1996) 200m "zone of secondary influence" buffers for wetlands within the project area are currently contained within Precincts 1 and 14 (Long Swamp, Hendy Road Swamps, Conway Road Swamp), Precinct 2 (Conway Road Swamp) and Precinct 3 (for Long Swamp). Buffers for wetlands that lie beyond the eastern extent of the site are contained within Precincts 6 and 13. The 200m zone from the north-eastern tip of Lake Mt Brown extends into Precinct 7 by up to 100m, however a significant portion of this zone is occupied by Rockingham Road.

Since the original mapping of Hill *et al.* (1996), the wetland database has been regularly updated by the Water and Rivers Commission, and access to the database (11 July, 2003) indicates that the initially assigned management categories have been downgraded for 2 wetlands adjacent to the site; Wattleup Lake (Conservation to Resource Enhancement) and Wattleup/Pearse Road wetland, located slightly within the eastern boundary of the study area (50/50 split of Conservation and Multiple Use).

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From WRC's wetland mapping and database, Table 5.4 presents a summary of the characteristics of the relevant wetlands within and immediately adjacent to the study area. No further confirmation or reassessment of management categories has been conducted as part of this investigation; however the boundary of wetland dependent vegetation has been redefined through specific site survey for the southern wetland areas through:

- Mapping and review of current WRC wetland boundaries;
- Updating the wetland mapping based on the determination of current wetland dependent vegetation using current aerial photography and ground-truthing (using GPS where necessary);
- Conducting broad-scale vegetation condition mapping for upland areas in accordance with *Bush Forever* criteria;
- Logically recognising cadastral and other planning boundaries;
- Recognising the importance of the long-term viability of the ultimate reserve proposal; and
- Proposing possible areas for conservation in the south of the HVWRA to be considered at the structure planning stage of the precincts, subject to further environmental investigation.

The original wetland mapping on aerial photography for Long Swamp, Hendy Road Swamps, and Conway Road Swamp provided by the WRC, together with 50m and 200m buffers, is depicted in Figure A in Appendix E.

The assessment determined the current edge of wetland dependent vegetation for each wetland, and annotated a 50m buffer irrespective of the management category of the wetland (Figure B in Appendix E).

Upland vegetation was also considered as an important extension of the wetlands, providing vertical transition of habitat and associated values. Relatively large areas of vegetation in Good to Excellent Condition exist between Conway Road Swamp and Hendy Road Swamps, north of Anketell Road.

The objective and basis of the analysis was to ensure that the boundary of the southern wetlands proposed within the Hope Valley – Wattleup Proposed Master Plan be reviewed to ensure that current environmental values of the area are determined. As an outcome of this, areas proposed by the Western Australian Planning Commission

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for Parks and Recreation were identified. Figure D of Appendix E defines the areas proposed for P&R reservation, together with other areas identified as having potential conservation value for consideration at the precinct structure planning stage.

An analysis of the benefits of the rationalised southern Parks and Recreation boundary and proposed conservation areas is presented in Section 5.3.5.

Thomsons Lake and Banganup Lake are located east of the study area, and Brownman Swamp and Lake Coogee are located west of the study area and Rockingham Road and are a component of the Beeliar Regional Park. All are outside of the Hill *et al.* (1996) 200m Secondary Zone of Influence, have assigned Conservation management categories by the WRC, and are EPP wetlands (see definitions following).

In terms of the groundwater catchments of the wetlands, the study area is located outside of the EPA's (1998) Groundwater Environmental Management Area for Thomsons Lake (which corresponds to the groundwater catchment for this important wetland) and Banganup Lake, and is on (or slightly in) the boundary of the groundwater catchment for the Wattleup/Pearse Road wetland and Wattleup Lake. Groundwater flow in the study area is generally in a westerly direction towards the coast (Figure 12), although small local directional variations do occur. Whilst there is no direct hydrological connection between these wetlands, an indirect connection may be considered to exist in that the wetlands are all surface expressions of the local groundwater.

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**TABLE 5.3**  
**Wetland Management Categories**  
(after WRC, 2001)

Management Category	General Description	Management Objectives
Conservation (C)	Wetlands support a high level of ecological attributes and functions	<p>Highest Priority Wetlands. Objective is preservation of wetland attributes and functions through various mechanisms including:</p> <ul style="list-style-type: none"> <li>• Reservation in national parks, crown reserves and State owned land;</li> <li>• Protection under Environmental Protection Policies;</li> <li>• Wetland covenanting by landowners.</li> </ul> <p>These are the most valuable wetlands and the Commission will oppose any activity that may lead to any further loss or degradation. No development.</p>
Resource Enhancement (R)	Wetlands which may have been partially modified but still support substantial ecological attributes and functions	<p>Priority Wetlands. Ultimate objective is for management, restoration and protection towards improving their conservation value. These wetlands have the potential to be restored to Conservation category. This can be achieved by restoring wetland structure, function and biodiversity. Protection is recommended through a number of mechanisms.</p>
Multiple Use (MU)	Wetlands with few important ecological attributes and functions remaining.	<p>Use, development and management should be considered in the context of ecologically sustainable development and best management practice catchment planning through landcare. Should be considered in strategic planning (e.g. drainage, town/land use planning).</p>

The *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992* identifies Long Swamp, which is within the study area, as requiring protection to maintain its environmental values. Lake Coogee, Anderson Road Swamp, Brownman Swamp, Lake Mt Brown, and Wattleup Lake, all of which are outside of the study area, are also protected by the Policy. The Wattleup/Pearse Road wetland is located partly within the study area. Wetlands protected by the Policy are afforded protection against disturbance or alteration, including to their hydrological regime.



**TABLE 5.4**  
**Summary of the Characteristics of Relevant Wetlands**

WITHIN STUDY AREA	WETLAND (Current WRC Code)	Type	Management Category	Area (ha)	EPP Wetland
	Long Swamp (17 Sc)	Sumpland	Conservation	14.3	Yes
	Hendy Road Swamps (19 Dm and 20 Dr)	Damplands	Multiple Use and Resource Enhancement respectively	1.5 and 2.0 respectively	No
	Conway Road Swamp (12 Dr)	Dampland	Resource Enhancement	2.1	No
* ADJACENT TO STUDY AREA	Anderson Rd Swamp (8 Sc)	Sumpland	Conservation	25.3	Yes
	Brownman Swamp (6 Sc)	Sumpland	Conservation	48.0	Yes
	Lake Mt Brown (13 Sc)	Sumpland	Conservation	15.5	Yes
	#Wattleup/Pearse Rd (22 Sc/m)	Sumpland	Conservation and Multiple Use	4.3	Yes
	Wattleup Lake (24 Lr)	Lake	Resource Enhancement	10.9	Yes

See Figure18 for wetland locations. \*Within Hill *et al.* (1996) 200m Secondary Zone of Influence. #Located on the eastern boundary of Study Area, small portion within.

Wetlands are valuable assets because they carry out a number of important processes or 'functions', either ecological (biological and chemical), hydrological or social (EPA 1993). There are a number of existing wetland evaluations and studies which provide guidance to the EPA on the relative international, national and regional significance of each wetland.

Wetlands which are nominated by Australia for inclusion in the List of Wetlands of International Importance under the *Ramsar Convention 1971* are considered to be

internationally significant. None of the wetlands within or immediately adjacent to the study area are listed or are known to be nominated for Ramsar listing; however Thomsons Lake east of the study area is listed.

Wetlands listed within the Australian Nature Conservation Authority's *Directory of Important Wetlands in Western Australia* and on the Australian Heritage Commission's *Register of the National Estate* list of wetlands are considered to be of national significance. None of the wetlands within or immediately adjacent to the site are listed within either of these registers; however Thomsons Lake east of the study area is listed.

The Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), which came into force in mid-2000, provides protection to matters of national environmental significance. The matters of national significance protected by the EPBC Act include migratory species protected under international agreements.

Thomsons Lake east of the study area and Lake Mt Brown west of the study area are identified in the City of Cockburn's environmental constraint mapping as important for migratory birds listed under the CAMBA/JAMBA treaties.

Limited studies that have identified wetlands of regional significance include:

- Conservation Through Reserves - System 6 Recommendations (EPA, 1983);
- Report on an Investigation into Scientific and Educational Values of Wetlands and Rivers in the Perth-Bunbury Region;
- A Systematic Overview of Environmental Values of the Wetlands, Rivers and Estuaries of the Busselton-Walpole Region; and/or
- *Bush Forever* recommendations (Government of Western Australia, 2000).

None of the wetlands within the study area were nominated within the System 6 Report, however Lake Coogee, Brownman Swamp and Lake Mt Brown (M92), and Thomsons, Banganup, and Wattleup Lakes (M93) were included.

No wetlands within the site are included in *Bush Forever*. However, the Beeliar Regional Park, which includes the wetlands west of Rockingham Road, are in *Bush Forever* Site No. 346, Thomsons Lake in Site No. 391, Banganup Lake is in Site No. 392, and Wattleup/Pearse Road sumpland and Wattleup Lake are in Site No. 393.

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Sections 5.1 and 5.2 also deal with relevant environmental legislation in some detail.

#### 5.3.4 Potential Impacts

The wetlands are an important part of the natural landscape and local habitat. Of particular significance in and around the HVWRP are Beeliar Regional Park (including Thomsons Lake, Lake Coogee, Harry Waring Marsupial Reserve (encompassing Banganup Lake), the Spectacles), Lake Mt Brown and Long Swamp.

Long Swamp has recognised intrinsic value and potential significance as a waterfowl breeding area. Along with the other southern wetlands, there is the potential to maintain and conserve an ecological linkage (Figure 21). Long Swamp has a Draft Revegetation Management Plan prepared by the Town of Kwinana, which may be useful in implementing the linkage, subject to review.

However, it is relevant to note that the wetlands within the study area are not pristine and have been historically impacted, and in many cases existing land uses adjacent to the wetlands include potentially conflicting activities such as market gardening, agriculture, and extractive industry.

The EPA (1997a) has formulated guidelines regarding adequate horizontal separation distances between wetlands and various land uses and recommends a minimum buffer of 50m, or 1mAHD higher, than the furthestmost extent of wetland dependent vegetation, which ever is the largest. In this case, and consistent with current government agency policy, an appropriate buffer to any wetland within the study area will be proposed by the Responsible Authority on a case-by-case basis to prevent unacceptable impacts (from future industry) on the water quality, ecology or the hydrology of the wetlands. The buffer will be determined at the structure planning stage of each relevant precinct, and require agreement with the EPA Services Unit prior to adoption and implementation.

The State Government Agency guidance regarding buffer requirements to wetlands is shown in Table 5.5.

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**TABLE 5.5**  
**State Government Agency Guidance Regarding Buffer Requirements to Wetlands**

Purpose of Buffer	Land Use Example	Recommended Buffer Width*
Reduction of impact of nuisance insects on residents (e.g. midges).	Residential housing.	800-1,000 m depending on orientation of wetland.
Protection from nutrient inputs.	Market garden.	200 m on transmissive soils, 100 m on non-transmissive soils.
Protection from pollution (e.g. petroleum hydrocarbons, surfactants)	Mechanical workshop.	200 m.
Protection from heavy metal contamination.	Mineral processing operation.	200 m.
Protection from pesticide drift.	Orchard.	200 m.
Reduction of sedimentation	Timber harvesting operation.	100 m.
Protection of groundwater quality.	Agricultural composting facility.	2,000 m in direction of groundwater flow for transmissive soils
Protection of avifauna nesting and roosting sites.	Residential housing.	200-800 m.
Protection from weed infestation.	Residential housing.	50-100 m.
Maintenance of natural water levels.	Vineyard.	200 m but dependant on water extraction.

*\*Buffer width recommendations may be varied at the discretion of the WRC as new data becomes available. Guidance on the WRC's buffer recommendations is received from the State Wetland Coordinating Committee sub-committee on wetland buffers.*

These generic buffers are provided as guidance only, and actual buffers will be subject to site specific investigations and subsequent negotiation between the Responsible Authority and the regulatory authorities.

However, it is acknowledged that an appropriate final buffer will require determination at the structure planning stage for these precincts, through on-the-ground determination of wetland characteristics, values and protection requirements.

Accordingly, potential impacts will be limited to those associated with indirect actions, which may include:

- Increased use of the wetlands by residents and visitors as passive recreation areas;
- Pressure on wetland vegetation through uncontrolled access;
- Invasion of weeds and possibly diseases through the disturbance of natural habitats;
- Changes in hydrology and pollutant loading; and
- Increased potential for fire as a result of adjoining development.

### 5.3.5 Proposed Management

The Proposed Master Plan will require that all wetlands located within the HVWRA be retained, and rehabilitated as part of the future development.

As highlighted in Section 3.3.3 of this report, an assessment to determine the current edge of wetland dependent vegetation for each wetland, and a 50m buffer irrespective of the management category of the wetland, located within the southern portion of the study area was undertaken (see Figure B of Appendix E). The objective and basis of this analysis was to ensure that the boundary of wetlands proposed within the Hope Valley – Wattleup Proposed Master Plan be reviewed to ensure that current environmental values of the area are determined.

Upland vegetation was also considered as an important extension of the wetlands, providing vertical transition of habitat and associated values. Relatively large areas of vegetation in Good to Excellent Condition exist between Conway Road Swamp and Hendy Road Swamps, north of Anketell Road.

As an outcome of this analysis the following Parks and Recreation areas was determined:

- a revised boundary of Long Swamp (i.e. the edge of wetland dependent vegetation mapped) together with a 50m buffer, with the exception of the area of land south of Hope Valley Road, which is considered to form an appropriate southern management boundary in this instance;
- the revised wetland boundary of the Conway Road Swamp (i.e. the edge of wetland dependent vegetation mapped) together with a 50m buffer, with the exception of the area of land west of Conway Road, which is considered to

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form an appropriate western management boundary, and a southern extension to Anketell Road; and

- An east-west linkage of upland vegetation from Conway Road Swamp east to the proposed Fremantle-Rockingham Highway road reserve.

Figure D in Appendix E shows the ground-truthed and revised boundary of Long Swamp and Conway Road Swamp and the extent of the 50m buffers, and the east-west upland linkage, which forms the basis of the Parks and Recreation reserves.

In addition, the following areas were identified as having potential conservation value for consideration in future structure planning in the south of the HVWRA, based on the outcomes of the current investigations:

- The largely vegetated north-south linkage from Long Swamp to the Hendy Road Swamps;
- All of the remaining eastern Hendy Road Swamps and an associated 50m buffer, together with the majority of the highly modified western “wetland”; and
- The part of the vegetated east-west linkage from Hendy Road Swamps to Conway Road Swamp not currently proposed for reservation, which encompasses a large area of upland vegetation in Good to Excellent Condition with good boundary to area ratio (it is noted that this linkage may eventually be bisected through the construction of the Fremantle-Rockingham Highway).

Figure D in Appendix E defines other areas identified as having potential conservation value for consideration in future structure planning in the south of the HVWRA, based on the outcomes of the current investigations.

However, it should be noted that through further environmental investigations the final buffer to all management category wetlands will be proposed by the Responsible Authority on a case-by-case basis, in accordance with surveyed environmental characteristics and values, and proposed buffer treatments, and in agreement with the EPA Service Unit. This will occur at the structure planning stage of each relevant precinct. The determination of the hydrological requirement of each wetland will form part of this process, and the Water Management Strategy.

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Stormwater generated within the HVWRA will be treated in accordance with Best Management Practices and Water-Sensitive Urban Design principles, with the objective of preferably reducing existing nutrient export from the Redevelopment Area.

Direct discharge to wetlands will not be permitted. Prior to any stormwater entering a resource enhancement or multiple-use wetland it will first pass through an artificial wetland, swale, sediment basin or litter/contamination trap. Stormwater run-off will be retained and treated within the development areas, wherever possible. Overflow of run-off from major rainfall events may enter wetland buffer areas by overland flow paths. It is noted that the DoE does not generally support the treatment of stormwater within designated wetland buffers.

Additionally, the hydrological characteristics and water requirements of the wetlands will be determined as part of the buffer determination and preparation of the Water Management Strategy. The hydrological regime of wetlands will be maintained.

More specifically, Section 7.3.3 of the Proposed Master Plan states:

*Wetlands*

*Land use and development within the Redevelopment Area shall be carried out and managed so as to maintain and enhance wetland quality and ecological function through suitable location of land uses and developments and implementation of appropriate management measures, as follows:*

- (a) Land use or development shall not adversely affect wetlands.*
- (b) Land use or development shall be set back from all wetlands according to a buffer which will be proposed by the Responsible Authority at the structure (Precinct) planning stage on a case-by-case basis in accordance with surveyed environmental characteristics and values, and proposed buffer treatments, and agreed with the EPA Service Unit prior to adoption and implementation.*

- (c) Land used for agriculture that is likely to drain toward wetlands or coastal waters shall be managed to reduce or eliminate nutrient export from that land into the wetland or coastal waters.*
- (d) In determining an application for land use or development, the Commission shall have regard for the Wetlands Conservation Policy for Western Australia 1997 or its current equivalent and any other relevant advice.*
- (e) The hydrological characteristics and water requirements of wetlands likely to be influenced by the implementation of the development will be determined to enable appropriate water management.*

#### 5.3.6 Proposed Outcome

Strong environmental provisions at the appropriate stages of planning, design and development will ensure that the conservation and ecological function values of wetlands within and adjacent to the Proposed Master Plan are protected or enhanced as part of the future development.

Consequently, with due regard to the planning principles underlying the HVWRP, the proposed provisions within the Proposed Master Plan and legislative environmental management capabilities, the EPA's objective for the Wetlands factor is able to be met.

### **5.4 Water – Surface Water and Groundwater**

#### 5.4.1 Preliminary EPA Objective

To maintain the quantity of water so that existing and potential environmental values, including ecosystem maintenance, are protected.

#### 5.4.2 EPA Scope of Work

*How will new development and land use in the scheme area avoid adverse impacts on the values supported by surface and groundwater resources?*

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Discuss issues relating to the ground and surface water resource, focussing on those issues relating to the quantity rather than quality of water, as protection of water quality to be addressed as a pollution management factor (see below). However, it is expected that the discussion in this section would closely tie in with the section on water quality below.

#### 5.4.3 Existing Environment and Policies

The HVWRA is composed of a predominantly modified landscape, as a result of agricultural and mining uses. The site is underlain mainly by superficial limestone, marl and cemented sand deposits (the superficial aquifer), which hosts useable quantities of potable to brackish water. There are a number of deeper sedimentary aquifers beneath the HVWRA, access to which is restricted by the former WRC, now the DoE.

The superficial aquifer is recharged by rainfall, plus some upward leakage from the underlying Leederville aquifer. Although limestone has a very low intrinsic permeability (hydraulic conductivity), the presence of karstic features, such as dissolution cavities and cavernous flow tubes, imparts a complex permeability distribution through the limestone. In general, the limestone has an estimated bulk permeability of about 5 to 10 m/day but where cavernous flow tubes are intersected, bore permeabilities could be well in excess of 1,000m/day (WAWA, 1993). Sand deposits in the area tend to have more uniform hydraulic properties than limestone, with permeabilities generally ranging between 5 to 20m<sup>2</sup>/day. These permeabilities, coupled with westerly regional groundwater flow, indicates that groundwater beneath the HVWRP generally travels into underlying groundwater aquifers and ultimately to Cockburn Sound. The HVWRA is also on the western edge of the Jandakot Groundwater Mound, a major groundwater recharge area, also used as a potable water source (Figure 11). However, groundwater beneath the HVWRA does not flow towards the Mound.

As a general rule only superficial aquifer is available for private domestic and commercial use. Some groundwater within the site is potable, although more brackish water occurs down gradient from some wetlands, Alcoa tailings storage facilities and in the vicinity of Cockburn Cement. Some isolated pockets of contaminated sites also occur within the site (see Section 3.3.4 of this report).

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There is currently limited water supply, sewer and drainage infrastructure within the HVWRA. A water main along Rockingham Road reportedly has enough capacity to service new developments in the HVWRA. However, reticulation of water supply via the current distribution network is generally restricted to the immediate residential areas of Hope Valley and Wattleup. Many of the Hope Valley and rural-residential dwellings obtain their water from rainwater tanks and/or groundwater bores.

There are currently four sites of potential groundwater influence within the HVWRA and one adjacent, which are licensed by DoE and which influence redevelopment:

- Cockburn Cement's Munster Operation (cement and lime production);
- City of Cockburn's Henderson landfill;
- Western Power's Perron Quarry fly-ash disposal site; and
- Alcoa Refinery Red Mud Residue/Tailings Dams to the south-west and south-east of the HVWRA.

The HVWRA contains no sewer and current residential premises utilise septic tanks and leach drain disposal systems. However, there is a sewer pressure main aligned along the western boundary of the HVWRA that transfers waste between the treatment facility at Woodman Point to the Point Peron offshore effluent disposal outlet.

Nutrients entering Cockburn Sound due to human activities fall into two broad categories: 'point' sources or 'diffuse' sources (DA Lord and Associates, 2001). Point sources include direct nutrient discharge from a focussed source, whereas diffuse sources are from no clearly defined point of discharge (DA Lord and Associates, 2001).

Diffuse sources are largely due to land uses in the catchment and are difficult to estimate accurately, however DA Lord as Associates (2001) considered that the main contributors of nutrients to the sound are industrial groundwater, and groundwater under agricultural land at Spearwood.

Of the estimated 300 tonnes of nitrogen entering Cockburn Sound in 2000, DA Lord and Associates (2001) indicated that groundwater contributions were the main input with 200.1 tonnes. As industrial uses in the catchment have significantly decreased, the relative contribution of rural groundwater is becoming more significant (DA Lord

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and Associates, 2001). In 2000, groundwater contributions accounted for 73% of total estimated discharge, of which 24% was from rural and other groundwater inputs.

Other contaminant loads due to human activities into the Cockburn sound also include both diffuse and point sources. Contaminant loads from industrial point sources are documented as part of DEP licence provisions but there is little data for diffuse sources (DA Lord and Associates, 2001).

The then WRC divided the Cockburn Groundwater Area into four administrative sub-areas based on geological and hydrogeological boundaries as part of the 2001 Interim Allocation Strategy, three of which are included in the HVWRA (see Figure 13). DoE is currently reviewing this Strategy and is considering reducing existing individual allocations.

Licenses for the abstraction of Groundwater are allocated by the DoE. The DoE implements its water allocation decisions and regulates the use of water through the powers assigned to it under the *Rights in Water and Irrigation Act 1914*. There are 52 groundwater and 22 surface water management areas proclaimed under the Act. These cover the major water resources of the State and licensing is active in most areas.

The then WRC (2003) website advises that in areas proclaimed under the Act, the Commission ensures that water use is contained within sustainable diversion limits through a system of issuing licences for approved users. Licences are required for all artesian groundwater wells throughout the State. Water allocation plans set the local licensing policy and sustainable diversion limits for the local water resources for the area.

The site falls within the Jandakot Mound superficial aquifer groundwater flownet (Davidson, 2003), and lies within the Hope Valley and Leda Groundwater Allocation Sub-areas of the Perth –South West Region.

The entire HVWRA is contained within the catchment of Cockburn Sound and the draft Cockburn Sound EPP boundaries. The Cockburn Sound Policy Area as defined within the *Revised Draft of the Environmental Protection (Cockburn Sound) Policy 2002* (EPP) is shown in Figure 11.

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The draft EPP sets out the legal framework for protecting the environment of Cockburn Sound, establishes the principles for environmental quality management and designates the environmental values to be protected and maintained. Once approved by the Minister for the Environment, the EPP will be gazetted and will become legislation under the *Environmental Protection Act 1986*.

The Policy broadly aims to (EPA 2002):

- Establish Environmental Values, Environmental Quality Objectives (EQO) and Environmental Quality Criteria (EQC) for waters in Cockburn Sound;
- Identify a program to protect and improve environmental quality to support the Environmental Values of Cockburn Sound;
- Require a response to any exceedance of the EQC;
- Integrate environmental management of the Sound and its catchment;
- Provide for the establishment of an Environmental Management Plan to coordinate appropriate management actions against agreed objectives;
- Provide a mechanism for the Cockburn Sound Management Council to coordinate environmental management efforts; and
- Provide for a monitoring framework and regular reporting on progress against objectives.

Environmental Values and Environmental Quality Objectives for Cockburn Sound are further defined at Section 4.3.3.

Several policies relating to water usage within the project area may apply;

- *Interim Policy on Accessing the Leederville and Yarragadee Aquifers in Perth – December 2000*

The Leederville and Yarragadee aquifers in Perth provide significant volumes of groundwater for public and private purposes. The intent of this interim policy is to provide a consistent and comprehensive approach for allocation groundwater resources from these aquifers until appropriate tools are developed which will assist in reviewing this policy. This interim policy provides guidance to DoE Officers, water users and other interested parties.

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- *Statewide Policy No. 9 – Water Licensing – Staged Developments - DRAFT – September 2002*

This policy has been prepared to enable the DoE to address exceptional situations where secure water allocations are needed by licence applicants who require a reasonable amount of time to achieve full operating capacity and use their entire water allocation. Such organisations may only require small quantities of water initially, but need the security of an approved water resource to meet planned increases in their water requirements during the later stages of their development.

This policy also limits trading of water entitlements for staged developments to:

- Sales of viable businesses, where transfers or trades include all development conditions and the land; or
- Where the licensee demonstrates that they are unable to continue with their planned development, due to circumstances beyond their control, and the transfer or trade is consistent with the intent of the policy.

- *Statewide Policy No. 10 – Use of Operating Strategies in the Water Licensing Process – DRAFT – September 2002*

Due to the amendments made to the *Rights in Water and Irrigation Act 1914* in January 2001, the DoE is now required to address additional and site-specific issues to manage the impacts of water use on the water resource, environment and other water users. Many of these issues are too numerous and complex to incorporate into conditions on water licenses, so the DoE has developed a system of using operating strategies to supplement the licence conditions.

Operating strategies include a series of licensee's 'commitments' that specify:

- The water source(s) to be used;
- The licensee's land use, water abstraction regime, and the methods and infrastructure used to abstract, treat or distribute water;
- Monitoring and reporting requirements;
- Methods used to manage impacts on the environment and other water users;
- Contingency plans, describing how the licensee will alter their operations to cope with any directions to temporarily reduce water consumption; and

- Water efficiency measures used.
- *Statewide Policy No. 11 – Management of Unused Licensed Water Entitlements – DRAFT – March 2003.*

This policy has been prepared to provide a consistent approach in the management of unused licensed water entitlements. It established a set of principles that will guide the DoE when making decisions on licensed water entitlements that are not being fully utilised.

The DoE will manage the unused water entitlements commensurate with the level of risk and assign resources to area where it will be of most benefit. A major direction of the policy is the adoption by the DoE of a staged management approach depending on the level of use in an area. In areas where most or all of the available water has been allocated the DoE will seek to actively manage the unused water entitlements. In other areas where the demand for water is less the DoE's activity will be correspondingly less.

This approach will ensure that the water resources:

- Are used responsibly within appropriate limits;
- Equitable allocated; and
- Are seen by the community to be appropriately managed.
- *Statewide Policy No. 5 –Environmental Water Provisions Policy for Western Australia -November 2000, and*

The primary objective of this policy is to provide for the protection of water dependent ecosystems while allowing for the management of water resources for their sustainable use and development to meet the needs of current and future users (WRC, 2000). This policy describes the approach taken by the DoE in determining how water will be provided to protect ecological values when allocating the rights to use water. The policy lists the guiding principles to be followed and outlines a water allocation planning framework in which these principles are to be applied.

Environmental Water Provisions (EWP's) are the water regimes that are provided as a result of the water allocation decision-making process taking into account ecological, social and economic impacts (WRC, 2000). The former WRC prepared an Interim

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Allocation Strategy for this area in 2001, however the Strategy is currently under review and the DoE has advised that the Strategy is currently not available to the public.

The following additional policy may be of relevance when considering the HVWRA, further information about which can be found at [www.wrc.wa.gov.au](http://www.wrc.wa.gov.au)

- *Statewide Policy No. 6 – Transferable (Tradeable) Water Entitlements for Western Australia – October 2001.*

The *Revised Draft of the Environmental Protection (Cockburn Sound) Policy 2002* (EPP) is also of particular importance to the project and is discussed within the Catchment Management and Water Quality Section at 4.3.3.

The existing environment of the site is discussed in further detail within the Catchment Management, Wetlands and Water Quality Sections of this report at 4.3.3 and 5.3.3 respectively.

#### 5.4.4 Potential Impacts

A primary potential threat to water quantity issues is the impact on surface and groundwater resources as a result of proposed land uses and new development within the HVWRA. Potential impacts to surface water and groundwater quantities within the project area are as follows:

- Decreases of water levels and effects on wetlands (including the Conservation management category Long Swamp) and remnant vegetation as result of groundwater drawdown and through over-abstraction;
- Increases in wetland water levels as a result of surface water or stormwater discharge;
- Increases in stormwater runoff generated as a result of development within the project area that may transport nutrients and other contaminants and potentially affect the quality of discharges to Cockburn Sound; and
- Large volumes of groundwater abstraction required for industrial contamination recovery.

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Traditional urban stormwater management has focused on providing a highly efficient drainage system to collect and convey stormwater run-off using a combination of pipes and linear engineered flow paths directly into wetlands, rivers, ocean or local sewerage systems. To achieve more sustainable developments, stormwater cannot be considered in isolation and must be included in the broader planning and design of a development area.

The HVWRP and its future developments provide multiple opportunities to enhance the retention and treatment of stormwater and use in the urban landscape. This has been achieved through:

- Protection of Long Swamp through the creation of a conservation reserve and public park and appropriate buffer as approved by DoE;
- Creation of parkland, greenbelts and the retention of remnant vegetation near wetlands, along transport corridors and between development cells, which act as habitat corridors and buffers, and will be used for surface water retention and onsite infiltration and control of contamination;
- Provision (within road reserves and parklands) for the creation of artificial/linear wetlands, swales and sediment basins along transport corridors and as part of the minor/major stormwater management system;
- Phasing-out of horticulture and turf farming, landfills, extractive industries and the use of septic systems;
- Requirement as part of redevelopment for the connection to a deep sewerage system; and
- Stormwater containment and control along roads and onsite through the use of contamination and litter traps, gutters, kerbs, underground pipes, sediment basins etc. as part the minor/major stormwater management systems.

These initiatives will be implemented during development in accordance with current Water-Sensitive Urban Design (WSUD) guidelines, which provide a framework for incorporating stormwater-related issues for urban areas for water quality, water quantity and water conservation, plus broader environmental and social objectives as explicit design objectives and criteria. By further incorporating WSUD principles into the detailed precinct structure planning and subdivision developments, the protection and maintenance of environmental, cultural and recreational water resource values can be assured.

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Importantly, the implementation of the HVWRP will result in the replacement of horticultural activities, extractive industries, landfills and other potentially groundwater polluting activities together with regulatory agency control over groundwater abstraction rates and volumes.

#### 5.4.5 Proposed Management

Potential impacts on groundwater and surface water quantity within the HVWRA are highly significant issues that need to be addressed and well managed. The Proposed Master Plan has acknowledged the significance of these issues in its overriding environmental objectives:

From Section 7.1 of the Proposed Master Plan:

*It is intended that land in the Redevelopment Area be developed in accordance with best known environmental practice, as follows:*

*c) The use or development of land is to not have individual or cumulative adverse environmental or social impacts on:*

- Conservation Category Wetlands or any sensitive environments within or outside of the Redevelopment Area;*
- Soil, groundwater and surface water.*

Section 7.2 of the Proposed Master Plan expands on these intentions by providing detailed environmental objectives for the Proposed Master Plan. The Objectives state that land in the Proposed Master Plan is intended to be developed and managed in such a manner as to:

*(c) support the protection of sensitive environments and areas of environmental significance within and outside the Redevelopment Area, including Beeliar wetlands, Cockburn Sound, Long Swamp and Bush Forever sites;*

*(d) ensure that the aquifer is managed in a sustainable manner and that groundwater quality is maintained or improved;*

*(e) provide for on-site retention and infiltration of uncontaminated storm water;*

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- (i) *dispose of sewage and compatible wastes by connecting to a comprehensive sewerage system, or utilising an accepted alternative treatment system only when no comprehensive sewerage system is available;*
- (n) *prevent the contamination of soil and water that exceeds allowable ecological or health levels;*
- (o) *prevent contaminated soil or water interacting with and entering surface or ground water flows and extending beyond the Redevelopment Area boundary;*
- (p) *minimise the impact of surface run-off so as to protect and maintain the integrity, functions and environmental values of natural catchments, hydrological systems and wetlands, within and adjacent to the Redevelopment Area.*

In order to implement the above objectives the Proposed Master Plan proposes further controls on land use and development within the Proposed Master Plan area in Section 7.3.2, Water Resource Management:

*Land use and development within the Redevelopment Area shall be carried out and managed so as to minimise the disturbance and contamination of water catchments and groundwater through the appropriate siting, design, and management of development, in such manner as to:*

- (a) *maintain the quality and quantity of water resources sufficient for existing and future environmental and human use;*
- (b) *maintain, and where practicable, improve surface and groundwater quality through water sensitive design and management;*
- (c) *make provision for drainage systems that optimise the retention, consumption and/or infiltration of drainage on site;*
- (d) *avoid the potential for the intensification of flooding as a result of inappropriately located land uses and development;*

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- (e) *where industrial processes create liquid effluent, incorporate on-site containment, management, contaminant stripping and appropriate disposal;*
- (f) *not impact on the flow or quality of surface or ground water on neighbouring land;*
- (g) *be connected to a comprehensive sewerage system, with the exception of a single house where no such system is available;*
- (h) *utilise, where practical, alternative waste water disposal systems, including reuse and recycling;*
- (i) *have regard for the State Water Quality Management Strategy for Western Australia 2000, the Statement of Planning Policy No.27 Public Drinking Water Source and any other relevant advice; and*
- (j) *comply with the comprehensive Water Management Strategy for the project area.*

In addition to the Proposed Master Plan, the Planning Strategy for the Proposed Master Plan also provides for the management of groundwater and surface water quantity. The Planning Strategy states that:

- Redevelopment must maintain and, where practicable, improve groundwater quality and quantity through water-sensitive design and management.
- The intensification of flooding as a result of inappropriately located land uses and development must be avoided.
- Developments must make provision for drainage systems that optimise the retention, consumption and or infiltration of drainage on site.
- Where industrial processes create liquid effluent, they must include provision for on-site containment, management, contaminant stripping and appropriate disposal.
- Developments must make provision for drainage systems that optimise the retention, consumption and or infiltration of drainage on site.

- All development must be connected to a comprehensive sewerage system, with the exception of any existing single house where no such system is available.
- Where industrial processes create liquid effluent, they must include provision for on-site containment, management, contaminant stripping and appropriate disposal.
- Consider the availability of water resources to ensure maintenance of water quality and quantity for existing and future environmental and human uses.
- Encourage grey water re-use and dual-use corridors to collect and dispose of waste and stormwater to minimise demand on the sewerage system.
- Detailed design of a comprehensive water reticulation network is required for each precinct structure plan/subdivision in liaison with the responsible utility.
- Create seasonally dry artificial wetlands to provide areas for drainage run-off and grey water disposal that minimise land take.
- Encourage use of wastewater and stormwater for irrigation of greenbelts, parks and sport/recreational facilities.
- Encourage use of wastewater for industry use.

In addition to the Planning Strategy, Planning Policy 1.3 (Landscaping), requires that in all instances, particular emphasis should be placed on developing landscaping that has regard for water conservation (reduced water use). The Policy requires that native species well suited to local climatic conditions, particularly long dry summers, should form the basis of landscape designs. This should assist in reducing the need for extensive reticulation of landscaped areas.

Where required however, the policy states that reticulation should be designed and installed in accordance with waterwise principles, and ensure easy, cost effective maintenance. These principles and practices will be required to be demonstrated in the design and development of landscaping in the public domain.

The Water Management Strategy (WMS) for the Proposed Master Plan will address water quality and quantity management issues, as outlined in Section 4.3.5, and will be an over-arching philosophy describing the HVWRP water balance objectives and practical measures which can be implemented through precinct structure planning and design. For example, it may require that where large roofed areas are present rainfall

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tanks can be installed to harvest rain, thereby reducing stormwater run off and providing a source of water for irrigation or industrial or irrigation use. However it is noted that the water collected by rainfall tanks in this area is not recommended for potable use.

The WMS will also endeavour to promote the reduction of the volume of water abstracted from aquifers and the volume of disposed wastewater through current best management practices, including wastewater reuse.

The hydrological characteristics and water requirements of wetlands present within the HVWRA will be determined as part of the wetland buffer assessments and included in the Water Management Strategy to provide for the protection of the water dependent ecosystems (refer Section 5.3.5).

In addition, it is acknowledged and important to note that the allocation of groundwater resources and subsequent sustainable use will be managed by the DoE in accordance with the policies previously described. All significant abstraction will be under license according to allocation and sustainable practices, as determined and managed by the DoE.

#### 5.4.6 Proposed Outcome

With due regard to:

- the planning principles underlying the HVWRP,
- precinct planning, land use and development controls within the Proposed Master Plan and the Planning Strategy;
- preparation of a Water Management Strategy;
- implementation of Water-Sensitive Urban Design principles;
- management of groundwater abstraction through licences issued by the DoE;

the EPA's objective for water quantity maintenance within the project area is able to be met.

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## 5.5 Conservation Areas

### 5.5.1 Preliminary EPA Objective

To protect the environmental values of areas identified as having significant environmental attributes.

### 5.5.2 EPA Scope of Work

*How will the potential adverse impacts from new development and land use in the scheme area on conservation areas be avoided?*

Identify and describe existing and proposed conservation areas within and outside the scheme area that land use and development in the scheme area have the potential to impact. These include *Bush Forever* Sites/Regional Parks, and conservation category wetlands eg areas of bushland.

Identify existing issues, and potential impacts and issues for each conservation area (eg Rowley Road extension). Consideration should be given to conservation, recreation and landscape protection issues and impacts to existing uses and values in the conservation areas.

Describe the scheme measures proposed to protect and manage impacts on conservation areas, and other processes for dealing with potential activities in the scheme area that could affect on nearby conservation areas.

### 5.5.3 Existing Environment and Policies

#### *Conservation Areas within the Project Area*

#### *Long Swamp*

Long Swamp is a Conservation management category wetland intended for reservation, revegetation and enhancement as part of a proposed ecological linkage in the south of the project area. Long Swamp and other wetlands in the area (Hendy and Conway Road Swamps) encompassed by Precincts 1 and 14 have been identified for potential maintenance and protection through replanting of native vegetation, in

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accordance with the Town of Kwinana's Draft Revegetation Management Plan, to protect the habitat value of the area and provide the opportunity for a range of recreational uses.

Anticipated development within Precincts 1 and 14 includes:

- landscape enhancement and maintenance through planting of native vegetation as per the Town of Kwinana's Draft Revegetation Management Plan for Long Swamp;
- wetland creation and improvement;
- creation of walking trails and access paths;
- conservation/preservation of sites of historic and cultural value.

### Conservation Areas External to the Project Area

#### System 6

Prior to the establishment of the *Bush Forever* (Government of Western Australia, 2000) documents, a study commonly referred to as the System 6 Report (EPA, 1983), was part of a series of studies identifying areas of conservation significance within 12 regions (systems) of Western Australia. The recommendations of the System 6 report were reviewed and incorporated as part of the *Bush Forever* initiative described above.

Two System 6 areas; M92 Cockburn Wetlands – Western Chain and M93 Cockburn Wetlands – Eastern Chain, are located in proximity to the project area, parts of which are now incorporated within *Bush Forever* Sites No. 346 and 391/392 respectively. No System 6 areas are located within the project area.

#### Beeliar Regional Park

Regional conservation areas in proximity to the project area include areas of the Beeliar Regional Park, which abut the study site for most of its length along the western boundary, and close to the boundary on the east (Figure 17).

The Beeliar Regional Park was established primarily to protect and conserve the wetlands and associated vegetation and fauna assemblages in what are known as the eastern and western chains of the Cockburn Wetlands. Wetlands situated closest to

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the study site are the Brownman Swamp and Lake Mt Brown immediately to the west, and Thomsons Lake and Banganup Lake to the east.

Much of the Beeliar Regional Park has high conservation value due to its rich diversity and complexity of ecosystems which are limited in distribution across the Swan Coastal Plain. APP (2003) notes that even though the wetlands within the Park are by no means pristine, they form one of the most important systems of wetlands remaining with the Perth Metropolitan Region (Conservation Commission of Western Australia, 2001).

In addition to these areas, conservation areas incorporating vegetation of regional significance have been included within *Bush Forever* Sites (Government of Western Australia, 2000), as detailed in Section 5.1.3 and below.

### *Bush Forever Sites*

The Proposed Master Plan area does not include any *Bush Forever* sites, however three *Bush Forever* sites are located immediately adjacent to the eastern boundary of the project area (*Bush Forever* Sites 267, 393 and 392). The adjacent *Bush Forever* sites and other *Bush Forever* sites that lie in close proximity to the project area are listed below and shown in Figure 17;

- *Bush Forever* Site No. 267 – Mandogalup Road Bushland, Hope Valley,
- *Bush Forever* Site No. 346 – Brownman Swamp, Lake Mt Brown and Adjacent Bushland, Henderson/Naval Base,
- *Bush Forever* Site No. 391 – Thomsons Lake Nature Reserve and Adjacent Bushland, Beeliar, and
- *Bush Forever* Site No. 392 – Harry Waring Marsupial Reserve, Wattleup (adjacent to Site No. 391).
- *Bush Forever* Site No. 393 – Wattleup Lake and Adjacent Bushland. Wattleup/Mandogalup is also located in the eastern proximity of the project area and is identified by *Bush Forever* mapping as Rural Complementary.

*Bush Forever* Sites No. 268 – Mandogalup Road Bushland, Mandogalup, No. 349 Leda and Adjacent Bushland, Leda and No. 269 – The Spectacles are situated away further from the project area, to the east and south respectively.

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### Existing Linkages

The creation or enhancement of ecological linkages is one of the important environmental opportunities provided by the development proposals for the HVWRP.

The strategic plan for Perth's Greenways (Tingay and Associates, 1998) identified Russell Road as a link between Thomsons Lake and Woodman Point on the coast, and Stock Road (Rockingham Road) as a connection between the Brownman Swamp and Lake Mt Brown and Lakes Cooloongup and Walyungup to the south (Figure 20).

A further opportunity to maintain vegetation for an east – west connection, between Thomsons Lake and the Lake Mt. Brown bushland areas is presented by the road reserve of the proposed extension of Rowley Road from the Kwinana Freeway to the coast. Consideration should be given to widening the road reserve at the precinct planning stage to enable appropriate and viable revegetation and the retention of any native vegetation remnants along this link.

The Town of Kwinana has developed and adopted additional proposals to the Strategic Greenways. Of particular significance to the Master Planning for Hope Valley – Wattleup are the ecological linkages proposed by the Town of Kwinana which include the remnant bushland along Anketell Road, Long and Conway Road Swamps and the remnant bush adjacent to Hendy Road (Figure 20). As part of this proposal the Town has recently agreed with Alcoa that a wide remnant of the Alcoa land north of Anketell Road to the east of the study site will be preserved as part of an east-west linkage. Details of this proposal are outlined within Section 5.1.5.

### Policies

Policies related to protection of wetlands and information regarding the classification of wetlands and their protection are detailed at Section 5.3.3 of this report, and include The Swan Coastal Plain Wetland Atlas (Hill *et al.*, 1996), the WRC's Position Statement on Wetlands (2001), and the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*.

Also discussed within Section 5.3.3 and of relevance to wetlands is the list of Wetlands of International Importance under the *Ramsar Convention 1971*, wetlands considered to be of national significance and listed within the Australian Nature

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Conservation Authority's *Directory of Important Wetlands in Western Australia* and on the Australian Heritage Commission's *Register of the National Estate*, and the CAMBA/JAMBA treaties which are of importance for migratory birds.

Policies relevant to other conservation areas with regard to biological diversity and protection of flora and fauna are detailed within Sections 5.1.3 and 5.2.3 of this Environmental Review. Of significance is the Commonwealth *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act), the *Wildlife Conservation Act 1950* the *Conservation and Land Management Act 1984* and EPA Guidance for the Assessment of Environmental Factors for flora and vegetation, and fauna (EPA 2003a, 2003b).

The above policies may be relevant to the conservation of biodiversity with particular regard to remaining areas of vegetation mapped by Heddle *et al.* (1980) as falling within the boundary of the Karrakatta Complex Central and South. Approximately 46 ha of remnant vegetation in the project area falls within the boundary of the Karrakatta Complex Central and South, which has 8% proposed protection, which is under the target 10% for complexes within the Swan Coastal Plain portion of the Perth Metropolitan Region.

#### 5.5.4 Potential Impacts

Potential impacts to conservation areas both within and external to the project area include:

- Impacts to wetlands within both the project area and possibly the Beeliar Regional Park as a result of pollution, or variations in groundwater and surface water quality and quantity;
- Impacts to *Bush Forever* Sites adjacent and in proximity to the project area; and
- Clearing of vegetation associated with ecological links within the project area and linking to Beeliar Regional Park and with the under-reserved vegetation complex Karrakatta Complex Central and South.

Potential Impacts to Conservation Areas are discussed further at Sections 5.1.4, 5.2.4 and 5.3.4 for Flora, Fauna and Wetlands respectively.

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#### 5.5.5 Proposed Management

There is one Conservation management category wetland within the HVWRA (Long Swamp), but no *Bush Forever*, System 6, or other conservation areas.

However, the management of conservation areas both within the project area and external to the site is important so as to avoid adverse impacts to the environment and to ensure the protection of and enhancement of the ecological values of the area and surroundings.

There is a need to consider important ecological linkages and incorporation of remnant vegetation and to protect the native flora and fauna of the area at each stage of planning. In order to achieve this objective, the Proposed Master Plan has acknowledged the issue in its overriding environmental objectives:

From Section 7.1 of the Proposed Master Plan:

*It is intended that land in the Redevelopment Area be developed in accordance with best known environmental practice, as follows.*

*(c) The use or development of land is to not have individual or cumulative adverse environmental or social impacts on:*

- *Conservation Category Wetlands or any sensitive environments within or outside of the Redevelopment Area.*

Section 7.2 of the Proposed Master Plan forms the basis of the management system to achieve the above objectives.

#### Section 7.2 - Environmental Objectives

*Land in the Redevelopment Area is intended to be developed and managed in such a manner as to:*

- (a) prevent any potential adverse environmental impacts, including those related to health and amenity, extending beyond the Redevelopment Area;*

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- (c) support the protection of sensitive environments and areas of environmental significance within and outside the Redevelopment Area, including Beeliar wetlands, Cockburn Sound, Long Swamp and Bush Forever sites;*
- (l) maintain and or enhance linkages between fauna habitats and vegetation communities - such as remnant vegetation, reserves and wetlands - to facilitate connectivity, accessibility and interaction of species;*
- (m) implement and support environmental best practice;*
- (q) prevent unacceptable levels of individual, societal or environmental risk;*
- (u) optimise development potential in an environmentally acceptable way.*

The Proposed Master Plan will also require that all wetlands within the HVWRP be retained, rehabilitated and enhanced as Conservation Areas within the future development. Section 7.3.3 of the Proposed Master Plan specifically refers to wetlands and states:

*Land use and development within the Redevelopment Area shall be carried out and managed so as to maintain and enhance wetland quality and ecological function through suitable location of land uses and developments and implementation of appropriate management measures, as follows:*

- (a) land use or development shall not adversely impact on wetlands;*
- (b) land use or development shall be set back from all wetlands according to a buffer which will be proposed by the Responsible Authority at the structure (Precinct) planning stage on a case-by-case basis in accordance with surveyed environmental characteristics and values, and proposed buffer treatments, and agreed with the EPA Service Unit prior to adoption and implementation.*
- (c) land used for agriculture that is likely to drain toward wetlands or coastal waters shall be managed to reduce or eliminate nutrient export from that land into the wetland or coastal waters;*

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- (d) *in determining an application for land use or development, the Commission shall have regard for the Wetlands Conservation Policy for Western Australia 1997 or its current equivalent and any other relevant advice; and*
- (e) *the hydrological characteristics and water requirements of wetlands likely to be influenced by the implementation of the development will be determined to enable appropriate water management.*

In addition to the Proposed Master Plan, the Planning Strategy for the HVWRP provides a long-term framework for the development. The purpose of the strategy is to ensure a comprehensive approach to the planning and development of the Hope Valley-Wattleup area and environs, setting the parameters for more detailed planning.

Section C2.4.3 of the Proposed Master Plan Report outlines the Environmental Strategy which includes a number of actions and items relating to improving the quality of the receiving environment and vegetation on a Precinct basis:

- *Redevelopment must maintain and or enhance linkage between vegetation community and fauna habitats, such as remnant vegetation, reserves and wetlands, to facilitate connectivity, accessibility and interaction of species.*
- *Support the protection of sensitive environments and areas of environmental significance within and outside the project area, such as Beeliar wetlands, Cockburn Sound and Bush Forever sites.*
- *Large or quality pockets of remnant vegetation, including those along transport corridors (i.e. road reserves) have been retained.*
- *Large portions of significant remnant vegetation will be retained and must be maintained and enhanced as habitat corridors, greenbelts, parks and recreational areas.*
- *These corridors, which support native vegetation, must be maintained and enhanced through revegetation, structured planting, landscaping and irrigation.*
- *Redevelopment must maintain and/or enhance linkage between vegetation community and fauna habitats, such as remnant vegetation, reserves and wetlands, to facilitate connectivity, accessibility and interaction of species.*

In addition to the measures proposed within the Proposed Master Plan planning process, Section 7.4.1 and 7.4.2 of the Proposed Master Plan refers to the provision of

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environmental information as follows that may be made at the development application level:

Clause 7.4.1

*An applicant shall submit sufficient information to enable the Commission to assess each application in accordance with the Statement of Environmental Intent, the Environmental Objectives, the Environmental Development Requirements, the other environmental provisions of this Part and all relevant standards and legal requirements and show how these will be met.*

Clause 7.4.2

*The information required to be provided to the Commission under clause 7.4.1 shall include the following:*

- (a) Information on the receiving biophysical environment after survey in accordance with Draft EPA Guidance No. 51 and No. 56 and any significant features or characteristics, in both a local and regional context;*
- (m) Demonstration of how significant environmental areas such as wetlands, habitat corridors, remnant vegetation, reserves and conservation areas are to be protected;*
- (n) Promotion of existing vegetation retention, revegetation, landscape enhancement and visual aesthetics;*
- (o) Management plans and commitments for the minimisation or protection of any significant environmental factors, impacts or issues including a review of the Town of Kwinana's Draft Revegetation Management Plan for Long Swamp;*

Environmental Objectives 7.4.2 (l) and (m) are addressed through the proposed 'Proposed Parks and Recreation Reserves and Potential Conservation Areas and Greenbelts' (Figure 21) with provision for vegetation retention and maintenance of ecological links and are discussed at Section 5.1.5 of this Environmental Review.

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The Conservation of key areas linking wetlands within the southern Precincts, providing connectivity with Conservation areas, would ensure both the retention and enhancement of ecological values within and beyond the project area. Conservation of Long Swamp and other wetlands within Precinct 14 and Precinct 1, as discussed in Section 5.3.5, forms part of additional proposals to Strategic Greenways adopted by the Town of Kwinana. Retention of these areas and pivotal connecting vegetation ensures linkages between these wetland systems, and potential linkages to large conservation areas of the Beeliar Regional Park including Lake Mt Brown, the Spectacles and Thomsons Lake.

As part of Strategic Greenways proposal the Town of Kwinana has also agreed with Alcoa that a wide remnant of the Alcoa land north of Anketell Road to the east of the study site will be preserved as part of an east-west linkage.

Opportunities for retention of significant portions of remnant vegetation which may contribute to the ecological values of Conservation Areas both within and external to the project area are detailed at Section 5.1.5 of this Environmental Review and will be considered in the structure planning for each precinct. The opportunities involve greater retention of vegetation to promote east-west linkages through the project area, particularly between Thomsons Lake and Brownman Swamp and portions of larger remnants close to the eastern edge of the HVWRA which form part of a potential east-west linkage along the planned extension of Rowley Road.

Conservation of Long Swamp will be managed through the review and implementation of the Town of Kwinana's Draft Revegetation Management Plan for Long Swamp, as discussed in Section 5.1.5. Retention and revegetation of bushland will help maintain and enhance Specially Protected Fauna (Quenda) habitat.

#### 5.5.6 Proposed Outcome

Strong environmental planning provisions will ensure that the conservation and ecological function values of conservation areas including wetlands, *Bush Forever* Sites and the associated Beeliar Regional Park within and adjacent to the HVWRA are protected or enhanced as part of the future development.

Consequently, with due regard to the planning principles underlying the HVWRP, the proposed provisions within the Proposed Master Plan and legislative environmental

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management capabilities, the EPA's objective for the Conservation Factor is able to be met.

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## 6.0 ENVIRONMENTAL ASSESSMENT – POLLUTION MANAGEMENT

### 6.1 Air Quality

#### 6.1.1 Preliminary EPA Objective

To ensure that air emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

#### 6.1.2 EPA Scope of Work

*How will the air quality of the scheme area be protected? How will adverse impacts on the air quality of sensitive land uses within and outside the scheme area potentially arising from land use and development in the scheme area, be avoided? How will land use within the scheme area be managed to ensure compatibility with air quality policies for the area?*

Identify existing land uses in and outside the scheme area, that may affect the air quality of the scheme area, and also any land uses of the scheme area that may affect air quality outside the scheme area.

Identify existing air quality issues and policies, and potential issues and impacts. Specifically refer to the *Environmental Protection (Kwinana) Atmospheric Wastes Policy 1999* and National Environment Protection Measures related to air quality (existing and proposed).

Identify scheme measures proposed to complement other processes that protect air quality.

#### 6.1.3 Existing Policies

The longest-serving and most comprehensive policy for managing air quality in the Kwinana region is the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999* (Kwinana EPP).

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The Kwinana EPP was originally approved in 1992. In brief, the EPP:

- identifies the area covered by the Policy and three regions (Area A - “industrial;”, Area B - “buffer” and Area C – “rural/residential”) within the overall Policy area. Specifically, Area B is a buffer area surrounding industry in East Rockingham, Kwinana Beach, Naval Base, Henderson and the Cockburn Cement facility north of Wattleup, within which is the Hope Valley-Wattleup Redevelopment Area (HVWRA). Area A is not contiguous and a portion contains the Cockburn Cement facility and its immediate surrounds (see Figure 10);
- established through associated regulations the air quality objectives for sulphur dioxide and total suspended particulates (see Table 6.1) with the opportunity for other pollutants to be added at later dates;
- allows the Chief Executive Officer of the DoE to establish a procedure for determining and applying limits on the emissions from each industrial source so that the cumulative impact of all such emissions did not exceed the air quality objectives; and
- requires the industries to monitor their emissions as well as ambient pollutant levels at various locations (in addition to any DoE monitoring) so that the achievement of the Policy objectives can be verified and enforced.

A notable positive outcome following the inception of the Kwinana EPP was the formation of the Kwinana Industries Council (KIC) to represent Kwinana industries. The Council was formed in 1991 and undertakes ambient air monitoring for the purposes of the Kwinana EPP on behalf of sulphur dioxide-emitting industries. Its activities have since expanded with its current aims including:

- coordination of the activities of the Kwinana Industries on a range of common issues; and
- working towards the long-term viability of the Kwinana Industrial Area (KIA).

**TABLE 6.1**  
**Kwinana EPP Ambient Air Quality Limits and Standards**

Region	Applicability <sup>(a)</sup>	Sulphur Dioxide Concentration ( $\mu\text{g}/\text{m}^3$ )			Total Suspended Particulates Concentration ( $\mu\text{g}/\text{m}^3$ )	
		1-hour	24-hour	Annual	15 minutes	24-hours
Policy area	Limit	-	-	-	1000	-
Area A	Limit	1400	365	80	-	260
	Standard	700	200	60	-	150
Area B	Limit	1000	200	60	-	260
	Standard	500	150	50	-	90
Area C	Limit	700	200	60	-	150
	Standard	350	125	50	-	90

<sup>(a)</sup> Standard means the concentration which it is desirable not to exceed. Limit means the concentration which shall not be exceeded. The Kwinana EPP is required to be reviewed every seven years.

One example of KIC's inter-industry coordinating mechanisms is the Kwinana Industries Mutual Aid (KIMA) organisation. A voluntary working group of technical specialists from within the Kwinana Industries share emergency response expertise and resources in the event of a major emergency. The KIMA structure is designed to ensure that industrial sites receive early warning of any potential impacts from other industries that may result from malfunctions, upsets or other atypical operating conditions.

The EPA's 1999 review of the Kwinana EPP considered the advent of the National Environment Protection Measure for Air Quality ("Air NEPM") in 1998 (NEPC, 1998) and the commencement of the Fremantle-Rockingham Industrial Area Regional Strategy (FRIARS) study as initiatives likely to shape the future form of the Kwinana EPP.

The Air NEPM sets standards for the seven<sup>iii</sup> air pollutants shown in Table 6.2 and requires the ambient monitoring and reporting of concentrations against the standards

<sup>iii</sup> Note that PM<sub>2.5</sub> was added to the original Measure in May 2003 and has Advisory Reporting Standards rather than standards sought to be met.

in accordance with a defined protocol. The NEPM establishes a goal of compliance with the standards by 2008. 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” (EPA 1999).

**TABLE 6.2**  
**National Environment Protection Measure for**  
**Ambient Air Quality Standards and Goals**

Pollutant	Averaging period	Maximum concentration	Goal within 10 years Maximum allowable exceedences
<b>Standards and Goal for Pollutants other than Particles as PM<sub>2.5</sub></b>			
Carbon monoxide	8 hours	9.0 ppm ( $\approx 11.2 \text{ mg/m}^3$ )	1 day a year
Nitrogen dioxide	1 hour	0.12 ppm ( $\approx 246 \text{ } \mu\text{g/m}^3$ )	1 day a year
	1 year	0.03 ppm ( $\approx 62 \text{ } \mu\text{g/m}^3$ )	none
Photochemical oxidants (as ozone)	1 hour	0.10 ppm ( $\approx 214 \text{ } \mu\text{g/m}^3$ )	1 day a year
	4 hours	0.08 ppm ( $\approx 171 \text{ } \mu\text{g/m}^3$ )	1 day a year
Sulphur dioxide	1 hour	0.20 ppm ( $\approx 572 \text{ } \mu\text{g/m}^3$ )	1 day a year
	1 day	0.08 ppm ( $\approx 229 \text{ } \mu\text{g/m}^3$ )	1 day a year
	1 year	0.02 ppm ( $\approx 57 \text{ } \mu\text{g/m}^3$ )	none
Lead	1 year	0.50 $\mu\text{g/m}^3$	none
Particles as PM <sub>10</sub>	1 day	50 $\mu\text{g/m}^3$	5 days a year
<b>Advisory Reporting Standards and Goal for Particles as PM<sub>2.5</sub></b>			
Particles as PM <sub>2.5</sub>	1 day	25 $\mu\text{g/m}^3$	Goal is to gather sufficient data nationally to facilitate a review of the Advisory Reporting Standards as part of the review of this Measure schedules to commence in 2005
	1 year	8 $\mu\text{g/m}^3$	

A Draft NEPM for Air Toxics has recently been released for public consultation (NEPC 2003b). This NEPM is designed, in the first instance, to improve the national



information base regarding ambient air toxics by requiring States/Territories to undertake monitoring of Benzene, Formaldehyde, Benzo(a)pyrene, Toluene and Xylenes. Standards for these substances are anticipated to be developed within eight years of the NEPM taking full effect.

The EPA's 1999 review of the Kwinana EPP anticipated development of a State-wide Environmental Protection Policy for air quality which would:

- “reference the Air NEPM standards for general application to air quality management programs and the assessment of development proposals in WA; but also
- exclude application of the standards within industrial areas and residence-free buffer areas around industrial estates; and
- for circumstances where the standards are not being achieved due to existing emissions, enable attainment and/or management programs to be established” (EPA 1999).

The review also recognised that the FRIARS process was the appropriate means for determining future land uses within the Kwinana EPP buffer, which includes the HVWRA.

The longer term approach favoured by the EPA in 1999 for managing buffers and air quality within the Kwinana region was “when the State Air EPP is established, subsume the Kwinana EPP into the State Air EPP. At such time as the Kwinana buffer size and shape is determined or amended as an outcome of FRIARS, amend the description of the buffer under the State Air EPP, as appropriate” (EPA 1999).

The FRIARS study recommended that the future development of the KIA buffer be for integrated industrial expansion and that residential and rural areas within the Hope Valley and Wattleup townships be acquired for that purpose.

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#### 6.1.4 Potential Impacts

##### Existing Impacts External to HVWRA

As referred to previously, the majority of the HVWRA is contained within Area B (buffer) of the Kwinana EPP Policy area.

The KIA lies to the south of the HVWRA, and industries produce a range of emissions including particulates, sulphur dioxide, odour, etc.

The currently active Alcoa Residue Storage Area is located immediately to the south-east of the HVWRA. This can cause dust, and possibly odour, emissions which have the potential to affect surrounding land uses.

The Kwinana Motorplex which lies immediately south of the HVWRA may contribute localised fuel vapour and vehicle combustion emissions.

The DoE operates air quality monitoring stations at Hope Valley and Wattleup. Parameters (other than meteorological data) currently being measured are sulphur dioxide, nitrogen oxides and visibility. Ambient air data collected from 1992 to 1999 at these and other monitoring stations was reviewed in DEP (2001). The review found that, at these sites:

- There were three occurrences of daily maximum 1-hour SO<sub>2</sub> concentrations above the Air NEPM standard. These were recorded at Hope Valley in January 1992 and at Hope Valley and Wattleup in January 1993.
- There were no occurrences of the annual SO<sub>2</sub> concentrations above the Air NEPM standard.
- There were no occurrences of a daily maximum 1-hour NO<sub>2</sub> concentration above the Air NEPM standard.
- There were no occurrences of the annual NO<sub>2</sub> concentration above the Air NEPM standard.
- The Victorian criterion for acceptable visibility was exceeded on average about 13 times per year between 1992 and 1999, and trended downwards.

Air toxics were sampled 1997 and 1998 at the Hope Valley monitoring station as part of the "Baseline Air Toxics Project" (DEP 2000). Air toxics concentrations were

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found to be about the same as those at Swanbourne, and for many species considerably lower than those measured in the Perth CBD and Duncraig. Annual average benzene concentrations were within acceptable health targets. The report notes that the air toxics monitoring was undertaken at Hope Valley over the summer months only, as this site is downwind of the KIA on the afternoon sea breeze. Low pollutant levels (i.e. SO<sub>2</sub> and NO<sub>x</sub>) are detected at this site during the winter season, which is attributed to the predominance of northeasterly winds over southwesterly winds. Volatile organic compound (VOC) sampling during winter was not considered to be cost effective.

Further monitoring of air toxics was undertaken around Perth, including Hope Valley, in 1999/2000 and consisted of 24 samples taken once per month for a year. Perth CBD samples had the highest concentrations, followed by Duncraig, Kewdale and Joondanna. Hope Valley appeared to have the lowest VOC levels on the days the samples were taken.

In general, based on existing information, there does not appear to be any evidence that levels of air contaminants addressed by the Air NEPM exceed the NEPM standards outside the Kwinana EPP industrial area. However, the comprehensiveness of the existing information has been questioned.

The DoE has recently commenced a “Gap Emissions Study” to investigate whether industrial emissions of other potential air contaminants warrant closer scrutiny. The scope of the review covers industries within the Kwinana EPP industrial and buffer areas. Phase 1 of the review which investigates emissions from the 25 largest industries is expected to be completed shortly (T. Barclay, pers com). An ambient air toxics monitoring program is expected to be developed before the end of 2003. This monitoring is expected to last one year and will include the Kwinana air-shed (A. Stuart, pers com). These studies may indicate requirements for reductions in emissions from existing industries and/or identify new issues required to be addressed in future development proposals.

The Department of Health has initiated consultation for a study of health issues that have been linked to industrial emissions in the region.



### Existing Sources of Potential Air Impacts Located within the HVWRA

There is a range of land uses and their associated emissions within the HVWRA that may cause air impacts within and external to the HVWRA. The key sites are (WAPC 2002):

- Cockburn Cement: This facility is located in Precinct 11 of the HVWRA and has the potential for dust impacts to surrounding land uses. It is the subject of current investigations into nitrogen dioxide emissions.
- Basic Raw Material Areas: There are a number of sand and limestone extraction and resource areas within the HVWRA. Existing operations (and future new extensions and sites) have the potential for localised dust impacts.
- Henderson landfill (500m buffer): The City of Cockburn operated landfill in Precinct 8 is a potential source of odour and dust. In order to minimise the potential for land use conflict, the landfill has buffers with different levels of restrictions imposed as part of its licence requirements.

### Future Sources of Potential Air Impacts Located Within the HVWRA

The land use planning underlying the Proposed Master Plan and Precinct usage has broadly incorporated the need for buffers between sources of emissions and land uses most sensitive to the impacts of emissions. Assuming that the precincts in the Proposed Master Plan containing General Industry are likely to be those having the greatest potential for external impacts from air emissions, Table 6.3 shows beneficial buffering that has been incorporated into the Proposed Master Plan for each such Precinct, and what appear to be the most significant general constraints that may apply to the industrial development within the Precincts. The constraints are based on the expectation that ambient air quality criteria will be expected to apply at commercial and residential areas, and individual residences outside residential areas.

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**TABLE 6.3**  
**Beneficial and Constraining Land Uses for General Industry Precincts**

Precinct	Beneficial buffering adjacent land uses	Constraints
1	Rural to south, Industry to west, Precinct 2 (southern transport) to north, Precinct 14 (Long Swamp) to east.	None appear significant.
3	Precinct 14 (Long Swamp) to south, Industry to west, Precinct 4 (Central Transport) to north, Precinct 6 (Eastern Gateway) to east.	Some residents may be located within Postans Rd area east of Precinct.
10 and 11	Precinct 8 (Resource Recovery) to south, Beeliar Regional Park to west, Precinct 12 (Northern Gateway) to north-west.	Residential area north of Fanstone Ave. Some residents may be located within rural area north and east of Precinct.

Note: General industry is also a proposed discretionary use in Precincts 2, 4 and 7.

A summary of potential emissions from the existing and proposed land uses from within each Precinct is shown in Table 6.4. A more detailed summary of emission types from various land uses proposed for each Precinct is shown in Table 6.5.

The buffer distances shown in Table 6.5 are defaults contained in the working draft update “Guidance for the Assessment of Environmental Factors - Industrial-Residential Buffer Areas (Separation Distances), Draft Policy (Guidance) No. 3” (EPA 1997b).



**TABLE 6.4**  
**Summary of Potential Air Emissions from the Existing**  
**and Proposed Land Uses within each Precinct**

Precinct	Title	Potential Emissions
1	Southern Industrial	Emissions from general industrial development (dependent on specific developments) and from motor sports-related activities.
2	Southern Transport	Emissions from existing light industry. Emissions from future transport related industry likely to be minor. Emissions from some future general industry.
3	Long Swamp Industrial	Emissions from small-scale light and service industrial development within the southern half of the Redevelopment Area dependent on specific developments. Emissions from some future general industry.
4	Central Transport	Emissions from containerisation facilities, distribution centres and warehousing, storage and other similar activities likely to be minor. Emissions from some future general industry.
5	Wattleup / Commercial	Emissions from commercial and retail activities likely to be similar to urban average.
6	Eastern Gateway	Emissions from eco industrial, technology, and research and development uses (business park style) likely to be similar to urban average.
7	Northern Transport	Emissions from containerisation facilities, warehousing likely to be minor. Emissions from light and service industry dependent on specific developments. Emissions from some future general industry.
8	Resource Recovery	Emissions from existing Henderson landfill. Emissions from future extended waste separation, resource recovery, by-product processing industries dependent on specific developments but may require careful management for odour and dust.
9	North-East Gateway	Emissions from eco industrial, technology, and research and development uses (business park style) likely to be similar to urban average.
10	Russell Road Industrial	Emissions from general industrial development dependent on specific developments.
11	Northern Industrial	Emissions from existing Cockburn Cement works. Emissions from general industrial development dependent on specific developments.
12	Northern Gateway	Emissions from eco industrial, technology, and research and development uses (business park style) likely to be similar to urban average. Emissions from marine-related industries dependent on specific developments.
13	To be determined	To be determined.
14	Long Swamp	Not likely to be significant.



**TABLE 6.5**  
**Air Quality Issues and Default Buffer Distances to Typical Land Uses for Industry-Related Activities Proposed for each Precinct**  
(Contents of table is indicative only)

Industry	1	2	3	4	5	6	7	8	9	10	11	12	13	Gas- eous	Noise	Dust	Odour	Risk	Buffer distance (m)
bulk goods handling (not Port-related) <sup>(b)</sup>	x	x	x	x			x	x		x	x				x	x		x	case by case
fast food outlet <sup>(b)</sup>					x												x		case by case
fuel depot if > 2000 tonnes capacity <sup>(a)</sup>	x	x	x	x			x	x			x						x	x	300-1000 <sup>(a)</sup>
industry (extractive) <sup>(a)</sup>												x			x	x			1000
industry (service) <sup>(b)</sup>					x										x				case by case
industry (light, service) <sup>(b)</sup>				x									x	case by case					
industry (Light, Rural and Service) <sup>(b)</sup>	x	x	x				x							case by case					
industry (extractive, light, rural, service) <sup>(b)</sup>								x		x	x	x		case by case					
industry (general) <sup>(b)</sup>													x	case by case					
motor vehicle repair <sup>(a)</sup>	x	x	x	x	x		x			x	x				x	x	x		200 <sup>(c) (d)</sup>
resource recovery <sup>(a)</sup>	x	x	x	x		x	x	x	x	x	x	x			x	x	x		150-1000 <sup>(c)</sup>
service station <sup>(a)</sup>	x	x			x					x	x	x		x	x		x	x	50-200 <sup>(a)</sup>
transport depot <sup>(a)</sup>	x	x		x			x	x		x	x			x	x	x	x		200
vehicle wreckers <sup>(a)</sup>		x	x	x			x			x	x				x	x			300 <sup>(d)</sup>

<sup>(a)</sup> Impacts and default buffer distances DoE internal working version (M Dawson, pers com) originally updated from EPA (1997b). <sup>(b)</sup> Impacts from consultant's experience.

<sup>(c)</sup> Considers composting , scrap metal recycling, waste depot. <sup>(d)</sup> Considers automotive spray painting, motor body works.

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### 6.1.5 Proposed Management

The Ministers for Planning and Infrastructure and Environment requested a review of the boundaries of the air quality buffer established under the Kwinana EPP. The redevelopment of the Hope Valley-Wattleup area, and recognition that land use separation to prevent conflict is more a planning issue than simply one of management of air quality, were instrumental in bringing about the review (DPI webpage, 2002, <http://www.planning.wa.gov.au/publications/kwinana/kwinana.html>).

The review of the status and boundary of the Kwinana EPP buffer was released for public comment in 2002 (WAPC, 2002). The review recommended that a composite planning and environmental protection buffer should be put in place that provides a “Residential Exclusion Area” to both protect nearby residents, and enhance the future of the KIA. In other words, the buffer originally designed to protect major residential areas from sulphur dioxide impacts from the KIA and which over time had been designated or assumed to have other functions, be formally recognised (subject to appropriate adjustments) as a general planning buffer between the KIA and residential areas.

The review of the Kwinana air quality buffer as released for public comment identified minor potential adjustments to the buffer boundaries consistent with its revised planning purpose and included potential adjustments in Precinct 13.

At the stage of preparation of this Environmental Review document, it is expected that an update document on the status of the Kwinana buffer review that reflects consideration of the submissions received will be released in the coming months.

Processes for implementing the review may include a new Statement of Planning Policy for the Kwinana area and revisions to the current Kwinana EPP. In addition to the buffer review, government initiatives for the Kwinana area include a review of emissions monitoring from industries in the Kwinana industrial area, monitoring of a range of potential pollutants including air toxics, licence reviews and health studies, as mentioned in Section 6.1.4.

There is no proposed residential development within the HVWRA therefore its integrity as the KIA buffer is maintained. Note that under rights for non-conforming land uses, residential uses may persist in the area and be potentially affected by

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existing emissions. Notwithstanding, air quality within the HVWRA needs to meet the standards expected for non-industrial areas noting for example, that the proposed land uses in Precinct 5 are commercial, Precinct 13 may be rural and the HVWRA is, in all respects, publicly accessible.

Consequently, buffers will still be required between industrial and non-industrial areas within the HVWRA. The purpose of the buffers would be to:

- reduce the risk of adverse effects to non-industrial areas arising from excessive industrial emissions that are unintended or accidental (resulting from one or more of equipment failure, human error and adverse meteorology); and
- ensure non-industrial areas are provided with adequate amenity taking into account visual amenity and protection from odour, dust and other nuisances.

As described previously, the outcome from future studies into industrial emissions and the quality of the Kwinana air environment will assist the future management of air impacts within and from the HVWRA as it is redeveloped.

There is an extensive list of legislation, policies and standards applicable to these land uses within and adjacent to the HVWRA and which control their activities. These range from local government by-laws, State legislation and licence requirements, to Commonwealth legislation and policies.

The roles of the Kwinana EPP and the Air NEPM as guiding policies for air quality protection have been described above. These appear likely to be incorporated into a State Air EPP, although the existing criteria are expected to remain unchanged. Criteria for additional pollutants are likely to be developed through the NEPM process and possibly through the State Air EPP.

In addition to development controls, the *Environmental Protection Act 1986* contains provisions to:

- assess specific new proposals,
- set conditions for the ongoing control of developments via the Minister for Environment (proposals assessed under Part IV of that Act) and the Department of Environmental Protection licences;
- enforce conditions; and

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- prosecute for pollution irrespective of any other conditions or controls.

The proposed Planning Strategy contains specific objectives and provisions for the maintenance of a high standard of air quality that meet existing and likely future requirements. These are shown in Table 6.6.

The Proposed Master Plan also provides for the maintenance of air quality in the Statement of Environmental Intent:

*It is intended that land in the Redevelopment Area be developed in accordance with best known environmental practice, as follows.*

- (a) The nature of industrial development is to be conducive to surrounding land uses outside the Redevelopment Area;*
- (b) The Redevelopment Area is to comprise a transitional buffer between the residential areas to the north and east and the heavy industry within the KIA.*
- (c) The use or development of land is to not have individual or cumulative adverse environmental or social impacts on:*
  - residential areas outside the Redevelopment Area;*
  - other land uses and amenities within or outside the Redevelopment Area;*
  - Air quality; and*
  - Future land uses within and surrounding the Redevelopment Area.*

**TABLE 6.6**  
**Air Quality Objectives and Provisions in Planning Strategy**

<p><b><u>Objectives</u></b></p> <p>Environmentally sensitive development that:</p> <ul style="list-style-type: none"> <li>– Minimises net emissions and waste</li> <li>– Maintains or improves the quality of the receiving environment (air, land, water)</li> </ul>
<p><b><u>Actions</u></b></p> <ul style="list-style-type: none"> <li>■ <b>Minimise emissions and waste</b> <ul style="list-style-type: none"> <li>• Land uses that may result in air, soil or water contamination/pollution must not be permitted unless it can be demonstrated that the proposed activities will not result in contamination above acceptable ecological and health investigation levels.</li> <li>• The potential for the deterioration of air quality as a result of inappropriately located or managed development must be avoided and not permitted to extend beyond the HVWRA.</li> <li>• Developments must have regard to the relevant requirements of the Environmental Protection (Kwinana) (Atmospheric Wastes) Policy (1999a), Statement of Planning Policy No. 4: State Industrial Buffer Policy and the EPA's Guidance No 3: Industrial-Residential Buffer Areas (Separation Distances), or their respective equivalent.</li> <li>• Developments must make provision for the design and implementation of systems that minimises the release, accidental or otherwise, of atmospheric emissions.</li> <li>• Where industrial process would create dust, particulates or other atmospheric emissions, they must include provision for on-site containment, management, contaminant stripping and disposal.</li> <li>• Developments must not be permitted that may prevent, inhibit or adversely effect other permissible land uses or developments, unless it can be demonstrated through adequate provisions that no unacceptable influences are exerted.</li> </ul> </li> <li>■ <b>Improve quality of receiving environment</b> <ul style="list-style-type: none"> <li>• Redevelopment must be conducive to surrounding land uses and provide a transitional buffer between the surrounding residential areas and heavy industry within the KIA.</li> <li>• The redevelopment must have no significant individual or cumulative off-site environmental or social impacts, and unduly disrupt or adversely affect neighbouring developments.</li> </ul> </li> <li>□ Redevelopment must maintain and, where practicable, improve air quality through appropriate design and management</li> </ul>

The Environmental Objectives (Section 7.2) of the Proposed Master Plan also states that:

*Land in the Redevelopment Area is intended to be developed and managed in such a manner as to:*

- *prevent any potential adverse environmental impacts, including those related to health and amenity, extending beyond the Redevelopment Area;*
- *facilitate the establishment of a transitional buffer between the relevant residential and heavy industrial areas;*
- *ensure no significant net increase of emissions, such as noise, dust, particulates, odour, other air emissions, litter or light, occur in or extend beyond the Redevelopment Area;*
- *ensure that the generation or release of any emissions is kept within acceptable health levels;*
- *implement and support environmental best practice;*
- *protect, maintain and enhance air quality;*
- *promote energy efficient practices and processes.*

To achieve these objectives Section 7.3.4 in the Proposed Master Plan contains specific provisions to address the issue of Air Quality as it relates to land use and development:

*Land use and development within the Redevelopment Area shall be carried out and managed such to ensure that any individual or cumulative atmospheric pollution generated during the construction or operation of any development does not adversely affect neighbouring land uses, developments, employees, the general public, or environmentally significant areas, and prevents any unacceptable level of atmospheric pollution encroaching outside the Redevelopment Area boundary. Such land use or development:*

- (a) *shall maintain and, where practicable, improve air quality through appropriate design and management and commensurately avoid the potential for deterioration of air quality as a result of inappropriately located or managed land use or development;*

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- (b) *shall implement the concepts of “best practice” emissions minimisation as described in “Guidance for the Assessment of Environmental Factors - Implementing best practice in proposals submitted to the environmental impact assessment process, No 55, Draft” (EPA 2003);*
- (c) *shall minimise potential conflicts between existing and potential future neighbouring land uses within the Redevelopment Area, and activities that generate atmospheric pollution;*
- (d) *in relation to land use or development that may result in atmospheric waste generation, shall include an air quality assessment;*
- (e) *shall not incorporate development that may result in atmospheric pollution such as dust, gaseous particulates, odour and light and will not adversely affect neighbouring land uses, employees, the general public or environmentally significant areas;*
- (f) *shall not incorporate land use or development that may result in contamination or pollution, unless it can be demonstrated that the proposed activities will not result in contamination above the acceptable ecological or health levels prescribed in the National Environmental Protection Council (Ambient Air Quality) Measures, or equivalent, and any other standards recognised in Western Australia;*
- (g) *shall incorporate appropriately designed and implemented systems that minimise the release, accidental or otherwise, of atmospheric waste emissions;*
- (h) *where industrial process may create dust, particulates or other atmospheric emissions, shall incorporate on-site containment, management, contaminant stripping and disposal;*
- (i) *shall facilitate reduced travel demand and adequate access to public transport and walking and cycling infrastructure;*
- (j) *shall incorporate energy efficiency in the siting and design of buildings;*

- (k) *shall incorporate the retention of existing vegetation and/or revegetation of places;*
- (l) *where practical, shall utilise alternative energy generation, including renewable energy; and*
- (m) *shall have regard for the relevant requirements related to atmospheric pollution of the Environmental Protection (Kwinana) (Atmospheric Waste) Policy (1999), the Air Quality Management Plan for Perth 2000 and Statement of Planning Policy No. 4: State Industrial Buffer Policy or their respective equivalents and any other relevant requirements.*

The provisions could be enhanced by taking advantage of the HVWRA's close proximity to the Kwinana Industrial Area and encouraging industrial developments that reduce environmental impacts from the KIA. Relevant cleaner production/waste minimisation strategies include (EPA 1993b):

- substitution of less toxic raw materials;
- industrial symbiosis (one industry using another's waste as a raw material);
- on-site recycling or reuse of waste streams;
- cogeneration of power using waste heat;
- cleaner process technologies and process modification;
- environmentally friendly product design;
- energy-efficient technologies; and
- waste treatment.

Depending on the nature and scale of industrial developments within the HVWRA, an industry coordinating association such as the KIC, could have the following roles:

- facilitate opportunities for cleaner production concepts, particularly industrial symbiosis, waste management and cogeneration opportunities;
- facilitate inter-industry management of the impact of residual emissions on adjacent/nearby sites;
- coordinate ambient air monitoring of the cumulative impacts of industries within the HVWRA; and

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- facilitate and provide a focal point for ongoing liaisons between HVWRA industries and the local community.

#### 6.1.6 Proposed Outcome

With due regard to the planning principles underlying the HVWRA, the proposed provisions within the Proposed Master Plan and the Planning Strategy, and legislative environmental management capabilities, the EPA's objective for the air quality factor is able to be met.

### **6.2 Water Quality**

The assessment and discussion on this factor has been amalgamated with the factor of Catchment Management (Section 4.3).

### **6.3 Soil Quality**

#### 6.3.1 Preliminary EPA Objective

To ensure that rehabilitation achieves an acceptable standard compatible with the intended land use, and consistent with appropriate criteria.

#### 6.3.2 EPA Scope of Work

*How will soil and groundwater contamination arising from new land uses and developments in the scheme area be avoided? How will any potential existing contamination be managed before new land use and development proceeds?*

Identify existing and potential sites (or categories of sites) that may be contaminated, and contamination issues.

Identify potential impacts and issues.

Identify scheme and planning measures to ensure contaminated soil and groundwater is remediated to the standard suitable for the proposed land use, to complement other (non-planning) processes.

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Identify scheme provisions to combat new contamination, and any complementary planning processes.

### 6.3.3 Existing Environment and Policies

A desktop Preliminary Site Investigation (PSI) has been conducted with reference to the procedures advocated in the Department of Environmental Protection *Guidelines for Contaminated Sites Management Series* to assess the potential for soil and groundwater contamination within the site. The PSI involved a review of the following information sources to identify potential areas and sources of potential contamination within the HVWRA:

- Department of Environment (DoE) *Site Legaci* Database
- City of Cockburn Environmental Constraints Maps
- HVWRP Masterplan

Areas and sources of potential soil and groundwater contamination in the HVWRP are shown in Figure 22 and include:

- Animal-based industries including poultry farms, piggeries and feedlots
- Municipal waste landfill sites
- Horticultural properties including market gardens
- Unsewered residential areas
- Petrol stations
- Electricity generation solid waste (fly-ash) disposal sites
- Pipelines (oil, fly-ash, shellsand)
- Cement works

In addition, Alcoa's bauxite refining residue ponds are located outside of the HVWRA but groundwater contamination plumes are reported to be travelling in a north-westerly direction into the south-east of the HVWRA.

The DEP (2001b) classifies the historical activities nominated above as potentially contaminating industries or land uses that will require further assessment and management to ensure that soil and groundwater quality in the HVWRA is to an acceptable standard that is compatible with intended land uses.

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#### 6.3.4 Potential Impacts

By today's public health and environmental standards, soil and groundwater within the HVWRA may have been impaired by the historical activities nominated in Section 6.3.3. Table 6.7 lists the potential contaminants of concern associated with the historical activities identified in DEP (2001b).

Redevelopment of the HVWRA as proposed will see the reduction and removal of many potentially contaminating activities and land uses. Reduced horticultural activity plus the removal of the unsewered Hope Valley and Wattleup townsites will substantially reduce level of nutrients, trace metals and pesticides entering soils and groundwater. Animal based industries together the Western Power fly-ash dump and Henderson landfill will be progressively phased out, rehabilitated and where practicable, redeveloped for other industrial land uses.

**TABLE 6.7**  
**Potentially Contaminating Activities and Associated Contaminants of Concern**

Activity/Industry/Land Use	Contaminants of Concern (Indicative Only)
Intensive agriculture	Metals Pesticides Nutrients Nitrate Salinity
Landfill sites	Polychlorinated Biphenyls Hydrocarbons Sulfides Metals Organic acids Nutrients Polycyclic aromatic hydrocarbons Ammonia Total dissolved solids Landfill gas
Market gardens	Metals Pesticides
Power generation (flyash)	Metals Sulfate Total dissolved solids Selenium
Service stations	Metals Petroleum hydrocarbons Monoaromatic hydrocarbons Polycyclic aromatic hydrocarbons Phenols Chlorinated hydrocarbons Oil and grease

Industrial land uses create the potential for contamination to occur through the use, storage and transport of raw materials, process chemicals and manufacturing waste.

Planning and development controls will be established to ensure that all land uses that may result in soil or water contamination/pollution are not permitted unless they can demonstrate that the proposed activities will not result in unacceptable contamination. Developments that have the potential for generating contamination will be required to demonstrate full on-site containment and appropriate management procedures, including emergency spill management and disposal.

### 6.3.5 Proposed Management

Future developments within the HVWRA will be advised of potential degraded and contaminated land and will be required to develop processes to facilitate its rehabilitation for appropriate future use and land compatibility. Prior to a change in land use or development, site specific contamination assessment and management will be performed to the satisfaction of the WAPC and DoE. Contamination assessment and management will be undertaken using a staged iterative process advocated by the DEP *Contaminated Sites Management Series* as shown in Figure 23.

It is noted that four sites of significance within and adjacent to the HVWRA may influence short to medium term redevelopment. These include:

- Cockburn Cement's Shellsand Operation
- City of Cockburn's Henderson Landfill
- Western Power's Perron Quarry fly-ash disposal site
- Alcoa Refinery Bauxite Refining Residue Lakes

Each of the above facilities is subject to a DoE licence which specifies extensive environmental conditions including the monitoring and management of potential pollution. Nonetheless the implications of these facilities on soil and groundwater quality will be considered and managed when considering redevelopment of nearby land within the HVWRA.

Proposed development will be subject to planning and development controls to ensure that all land uses that may result in soil or water contamination/pollution are not

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permitted unless they can demonstrate that the proposed activities will not result in unacceptable contamination. Developments that have the potential for generating contamination will be required to demonstrate full on-site containment and appropriate management procedures, including emergency spill management and disposal.

Specifically section 7.3.1 of the Proposed Master Plan incorporates the following provisions:

*Land use and development within the Redevelopment Area shall be carried out and managed so as to prevent site contamination, and in the case of existing contamination, is to be suitably managed and remediated for future use, in accordance with the following:*

- (a) the use or development shall not result in soil or water contamination or pollution above acceptable ecological and health investigation levels;*
- (b) prior to the use or development of land, an applicant shall advise the Commission of the land use or development history of the land, for the purpose of preliminary site contamination assessment;*
- (c) where contamination above acceptable ecological and health investigation levels is suspected or detected, assessment, remedial works (if required) and validation of remediation shall be undertaken by suitably qualified persons in accordance with recognised State requirements.*
- (d) land the subject of remedial works shall not be developed or used for its intended purpose until the Commission receives certification that the remedial works are complete;*
- (e) any land contamination shall be fully contained on site and managed by appropriate procedures, including emergency spill management and disposal.*

### 6.3.6 Proposed Outcomes

The HVWRP will have a net environmental benefit by replacing some largely uncontrolled activities with new developments that will support remediation of existing contamination and be subject to rigorous pollution prevention measures.

With due regard to the planning principles underlying the HVWRP, the provisions within the Proposed Master Plan and legislative environmental management capabilities, the EPA's objectives for Soil Quality will be met.

## **6.4 Noise**

### 6.4.1 Preliminary EPA Objective

To protect the amenity of nearby residents from noise impacts resulting from activities associated with the proposal by ensuring the noise levels meet statutory requirements and acceptable standards.

### 6.4.2 EPA Scope of Work

*How will noise amenity in the scheme area be maintained? How will adverse impacts on noise levels experienced by sensitive land uses within and outside the scheme area potentially arising from land use and development in the scheme area, be avoided?*

Identify existing sources of noise; existing noise issues; and potential noise issues and impacts that may arise from the implementation of the scheme.

Identify scheme measures to manage noise.

### 6.4.3 Existing Policies

Three primary policies exist that will assist in managing noise potentially generated in the HVWRA following implementation of the Proposed Master Plan.

Firstly, the *Environmental Protection (Noise) Regulations 1997* have been tailored to the *Environmental Protection Act 1986*. The regulations are a 'prescribed standard'

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and as such, noise emissions which exceed the prescribed standard can be regarded as 'pollution' and 'unreasonable noise' under Section 3 of the Act.

The basis for determining new assigned noise levels is the land use where the noise is received. The surrounding land uses are also included. This method recognises and protects quiet surroundings, while also recognising the influence of industry, commerce and transport on the noise environment. The assigned noise levels also recognise Australian Standards for noise and are generally consistent with the former Western Australian regulations, while providing greater certainty as to the standards to be achieved.

In brief, the Noise Regulations (EPA, 1997c) deal with:

- All noise passing from one premises to another, including from one unit to another block of units;
- Noise from public places as it affects adjacent premises; and
- Providing a basis for determining acceptable noise levels in relation to land use.

The regulations do not deal with:

- Noise within one premises, eg in a workplace;
- Noise from traffic on roads, or trains, except model trains;
- Noise from aircraft, except model planes;
- Noise from safety warning devices; and
- Noise from emergency vehicles.

Secondly, the *Draft Guidance No. 8: Guidance for Environmental Noise* (EPA, 1998b) was prepared to ensure proposals comply with the *Environmental Protection (Noise) Regulations 1997*. The aim of the guidance is to enhance the environmental approval process whilst ensuring that an appropriate standard to technical and public information relating to noise impacts is presented. This guidance statement does not address road and rail transportation noise.

Unlike other noise sources, transport noise from vehicles travelling on gazetted roads, and trains on general lines, is not handled by the Environmental Protection (Noise) Regulations 1997.

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Therefore thirdly, under the Preliminary Draft EPA (DEP 2000a) *Guidance for the Assessment of Environmental Factors No. 14 – Road and Rail Transportation Noise* (Version 3), draft guidelines for the acceptability of road and rail noise on noise sensitive premises are provided. The approach taken is similar to Australian Standard 2021 – 1994, which relates to aircraft noise received at a noise sensitive premise. The Draft stipulates zones where various Noise Amenity Ratings are considered acceptable, conditionally acceptable and Unacceptable (DEP, 2000a).

It is noted that some existing residents may choose to remain within the HVWRA beyond the implementation period. Potential exists for these residents to experience adverse impacts as a result of noise. The Proposed Master Plan objectives are such that this will be managed. This is demonstrated in Section 7.3.5 (Noise) which states:

*“Land use and development within the Redevelopment Area shall be carried out and managed in such manner as to ensure that any individual or cumulative noise generated during the construction or operation of any development does not adversely affect existing and potential future neighbouring land uses, developments, land uses, employees or the general public, and prevents any unacceptable level of noise encroaching beyond the Redevelopment Area boundary.”*

Part C of the above section is specifically related to existing residents: *“Such land use or development shall minimise potential conflicts between neighbouring land uses within the Redevelopment Area and activities that generate noise.”*

#### 6.4.4 Existing Environment and Potential Impacts

##### **Existing impacts external to HVWRP**

When operating, the Kwinana Motorplex (Figure 24) generates relatively high levels of noise which may intrude a considerable distance into the HVWRA, the extent of which depends largely upon the meteorological conditions at the time of race events, vehicle type and speed.

The KIA is located south of the HVWRA, and industries within the KIA produce noise which affects the HVWRA (Figure 25).

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Noise created by the KIA, and specifically the Motorplex to the south of the HVWRA, has substantially influenced redevelopment opportunities. The nature of the developments and industrial land use in the south, which are subject to higher noise levels, are those that require low-density workforces, such as general and transport industry like bulk handling depots and container storage.

### **Existing sources of potential noise impacts located within the HVWRP**

A freight railway line extends in a north – south direction inside the HVWRA. The Perth – Bunbury Highway (Rockingham Road) acts as a Primary Distributor and runs along the majority of the outside western border of the HVWRA.

Existing industries within the HVWRA that have the potential to create noise emissions include Cockburn Cement (Precinct 10), and the Henderson Landfill (Precinct 8). As noise studies are yet to be undertaken, it is not possible to quantify the impact of potential noise impacts from these industries at this time.

Intermittent noise is also experienced within the HVWRA as a result of existing road and freight railway networks. The proposal has the potential to increase noise emitted from the railway and from heavy trucks on designated freight routes due to increased use associated with industrial development.

### **Future sources of potential noise impacts located within the HVWRP**

The redevelopment of the Hope Valley – Wattleup area for industrial uses is intended to be in sympathy with surrounding land uses, and provide a transitional buffer between the surrounding residential areas and the heavy industry within the KIA.

It is the intention of the Proposed Master Plan provisions that undesirable industries (noise, dust or odour generating) would not be located near the Proposed Master Plan boundary and any associated private dwellings, nor would impacts extend beyond the Proposed Master Plan boundary. Section 7.3.5 states the following:

“Land use and development within the Redevelopment Area shall be carried out and managed in such manner as to ensure that any individual or cumulative noise generated during the construction or operation of any development does not adversely affect existing and potential future neighbouring land uses, developments, land uses,

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employees or the general public, and prevents any unacceptable level of noise encroaching beyond the Redevelopment Area boundary.”

A summary of potential noise emissions from the existing and proposed land uses from within each Precinct is shown in Table 6.8.

#### 6.4.5 Proposed Management

Management of noise issues within the HVWRA and surrounding areas are well provided for in the Proposed Master Plan.

Section 7.2 states the Environmental Objectives of the HVWRP, one of which is to:

- *ensure no significant net increase of emissions, such as noise, dust, particulates, odour, other air emissions, litter or light, occur in or extend beyond the Redevelopment Area.*

Section 7.3.5 of the Proposed Master Plan contains a specific strategy, objectives and provisions for the management of noise to ensure that noise is managed to meet existing and likely future requirements. These are shown below.

*Land use and development within the Redevelopment Area shall be carried out and managed in such a manner to ensure that any individual or cumulative noise generated during the construction or operation of any development does not adversely affect existing and potential future neighbouring land uses, developments, land uses, employees or the general public, and prevents any unacceptable level of noise encroaching beyond the Redevelopment area boundary. Such land use or development:*

- *shall maintain, and where practicable, reduce noise levels within the Redevelopment Area through appropriate design and management;*
- *shall not incorporate development that may result in excessive noise emissions and will not result in adverse impacts on existing and potential future neighbouring land uses, employees or the general public;*
- *shall minimise potential conflicts between neighbouring land uses within the Redevelopment Area and activities that generate noise;*



- *where development may result in noise generation, shall, include a noise assessment report in accordance with recognised good practice as in EPA Guidance No. 8 and 14 as relevant;*
- *shall not generate unacceptable noise levels outside the Redevelopment Area;*
- *shall avoid the potential for the exacerbation of noise as a result of inappropriately located or managed development;*
- *shall not incorporate land uses and development that may result in noise emissions that do not comply with Environmental Protection (Noise) Regulations 1997, or the current equivalent;*
- *where developments or industrial process would create excessive noise levels, shall incorporate provisions for the design and implementation of noise abatement systems; and*
- *must have regard for the potential of the contribution to cumulative noise generation.*

The Proposed Master Plan for the HVWRP states that developers within the HVWRA must comply with the *Environmental Protection (Noise) Regulations 1997* and planning and development controls to ensure that they will not contribute excessively to cumulative impacts. Development must prevent noise-related impacts adversely affecting their neighbours or permit off-site impacts to travel beyond the HVWRP boundary.

Redevelopment must maintain and, where practicable, reduce noise levels within the project area through appropriate design and management. It is therefore a provision of the Proposed Master Plan that prior to the consideration of any Development Application, a proposed development that is likely to lead to increased road or rail transport noise must prepare a noise assessment report. It is noted that in the preparation of such a report, the impact of existing sources of noise within the site be included in any cumulative noise assessment.

It is also important to manage existing noise impacts external to the HVWRA. The significant noise generated by the Motorplex prevents the development of sensitive premises over much of the HVWRA area and possibly all types in the south-west corner.

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**TABLE 6.8**  
**Summary of Potential Noise Emissions from the Existing and**  
**Proposed Land Uses within each Precinct**

Precinct	Title	Potential Noise Emissions
1	Southern Industrial	Noise from motor-sports related activities, freight railway line, and major regional road. Noise from KIA Noise Contour 45dB (Figure 25). Potential future industrial uses.
2	Southern Transport	Noise from existing light industry, potential resource recovery or industry, and major regional road. Noise from KIA, Noise Contour 45dB (Figure 25).
3	Long Swamp Industrial	Noise from potential resource recovery or industry dependent on specific developments, noise from motor-sports related activities, major regional road, and freight railway line. Noise from KIA, Noise Contour 40dB (Figure 25).
4	Central Transport	Noise from container facilities, distribution centres and warehousing, storage and other facilities likely to be minor. Noise from major regional road and freight railway line. Noise from KIA, Noise Contour 40dB (Figure 25).
5	Wattleup / Commercial	Noise from commercial and rail activities likely to be similar to urban average. Precinct is bound by major regional roads and freight railway line. Noise from KIA, Noise Contour 40dB (Figure 25).
6	Eastern Gateway	Noise from eco industrial, technology, and research and development uses (business park style) likely to be similar to urban average.
7	Northern Transport	Noise from container facilities and warehousing to be minor. Noise from light and service industry dependent on specific developments. Noise from freight railway line.
8	Resource Recovery	Noise from existing Henderson Landfill. Noise from future extended waste separation, resource recovery, by-product processing industries dependent on specific developments. Precinct is bound by a major regional road, and freight railway line.
9	North-East Gateway	Noise from eco-industrial, technology, and research and development uses (business park style) likely to be similar to urban average. Noise from freight railway line.
10	Russell Road Industrial	Noise from general industrial development dependent on specific developments. Site is bound by major regional road and freight railway line.
11	Northern industrial	Noise from existing Cockburn Cement works. Noise from general industrial development dependent on specific development. Noise from freight railway line.



Precinct	Title	Potential Noise Emissions
12	Northern Gateway	Noise from eco-industrial, technology, and research and development uses (business park style) likely to be similar to urban average. Noise from marine-related industries dependent on specific developments. Site is bound by major regional road and freight railway line.
13	To be determined	To be determined, apart from major regional road
14	Long Swamp	Not likely to be significant, apart from noise from motor-sports related activities.

#### 6.4.6 Proposed Outcome

With due regard to the planning principles underlying the HVWRP, the proposed provisions within the Proposed Master Plan and legislative environmental management capabilities, the EPA's objective for noise is able to be met.

### **6.5 Other Potential Pollutants**

#### 6.5.1 Preliminary EPA Objective

To ensure that emissions do not adversely affect environmental values or the health, welfare and amenity of people and land uses by meeting statutory requirements and acceptable standards.

#### 6.5.2 EPA Scope of Work

*How will the scheme area be protected from any other potential pollutants potentially arising from new land use and development? How will adverse impacts on sensitive land uses within and outside the scheme area potentially arising from land use and development in the scheme area, be avoided?*

Identify any other potential pollutants and emissions that may be associated with the implementation of the scheme, and pollutants/emissions from outside that may influence land uses in the scheme area, such as radiation and light emissions; issues that may arise; and how planning, and in particular the scheme, may address these issues as far as practical.



### 6.5.3 Existing Policies

Policies relating to dust, light and radiation are addressed in this section.

Dust and particulate emissions may potentially be generated throughout construction of the project, in particular during demolition of existing buildings and construction activities. Compliance with the EPA's (2000b) *Guidance Statement No 18 Prevention of Air Quality Impacts from Land Development Sites*, and adoption of this guidance will protect the surrounding land users such that dust and particulate emissions will not adversely impact on welfare and amenity or cause health problems.

Light "overspill" refers to light spilling outside of the development boundary. The obtrusive effects of outdoor lighting are best controlled by appropriate design, and Australian Standard AS4282-1997 regarding the Control of the Obtrusive Effects of Outdoor Lighting sets out guidelines for control of the obtrusive effects of lighting and provides recommended limits for the relevant lighting parameters to contain these effects to tolerable levels for various surrounding land uses.

The Radiation Protection Series is published by the Australian Radiation Protection and Nuclear Safety Agency (2003a and b) to promote practices that protect human health and the environment from the possible harmful effects of radiation.

There are four categories of publication in the Series:

- *Radiation Protection Standards* set fundamental requirements for safety. They are prescriptive in style and may be referenced by regulatory instruments in State, Territory or Commonwealth jurisdictions. They may contain key procedural requirements regarded as essential for best international practice in radiation protection, and fundamental quantitative requirements, such as exposure limits.
- *Codes of Practice* are also prescriptive in style and may be reference by regulations or conditions of licence. They contain practice-specific requirements that must be satisfied to ensure an acceptable level of safety in dealings involving exposure to radiation. Requirements are expressed in 'must' statements.

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- *Recommendations* provide guidance on fundamental principles for radiation protection. They are written in an explanatory and non-regulatory style and describe the basic concepts and objectives of best international practice. Where there are related *Radiation Protection Standards* and *Codes of Practice*, they are based on the fundamental principles in the *Recommendations*.
- *Safety Guides* provide practice-specific guidance on achieving the requirements set out in *Radiation Protection Standards* and *Codes of Practice*. They are non-prescriptive in style, but may recommend good practices. Guidance is expressed in ‘should’ statements, indicating that the measures recommended, or equivalent alternatives, are normally necessary in order to comply with the requirements of the *Radiation Protection Standards* and *Codes of Practice*.

#### 6.5.4 Existing Environment and Potential Impacts

##### *Existing impacts external to HVWRA*

The potential for dust nuisance will be highest in summer, when dry soil conditions and strong easterly and south-westerly winds may potentially carry dust outside of the HVWRA. Dust may be caused in the HVWRA during the construction phase, and ongoing operations, such as stock piles and non-sealed surfaces. On particularly windy days, complaints are received by the Kwinana Peel Regional Office of the DoE in regard to dust blowing off site from extractive industries within the HVWRA (Barclay, 2003).

The specific location and type of lighting sources within the HVWRA has not been determined. With inadequate control light overspill can be sufficient to provide serious nuisance and disturbance to surrounding land users. The level of glare associated with direct viewing of floodlights also may cause discomfort and annoyance to the recipient. The potential impacts of the lights to drivers on adjacent roads and any traffic signalling systems also needs to be considered.

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### *Existing impacts within the HVWRA*

Industry and associated infrastructure generate a range of emissions, including odour. The levels of odour may at times exceed levels considered acceptable to sensitive land uses such as residential areas, however levels of odour decrease with increasing distance from the source. Table 4.4 in Section 4 identifies which precincts may create odour emissions within the HVWRA.

The potential impacts associated with solid waste, non-sewer liquid wastes and litter are outlined in Section 4.3 of the Proposed Master Plan Report.

As well as external impacts, dust caused by the previously mentioned factors may also be considered a nuisance within the HVWRA. On particularly windy days, complaints are received by the Kwinana-Peel Regional Office of the DoE in regard to dust blowing within the site from extractive industries within the HVWRA (Barclay, 2003).

There are no known sources of radiation (above background levels) in the HVWRA. In the event that industries using radiation sources propose to locate in the HVWRA, then they will be required to relevant protection policy requirements (see Section 6.5.5).

#### 6.5.5 Proposed Management

Section 7.2 of the Proposed Master Plan text states that it is intended that land in the HVWRA be developed in accordance with best-known environmental practice including:

- *Ensuring no significant net increase of emissions, such as noise, dust, particulates, odour, other air emissions, litter or light, occur in or extend beyond the Redevelopment Area; and*
- *Ensuring that the generation or release of any emissions is kept within acceptable health levels.*

The short-term impacts of dust from construction will be managed according to industry best practice and in accordance with any applicable regulations. These

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include development and subdivision application conditions, and licensing and works approvals. Dust arising from construction works and bare ground should be controlled so as to comply with the requirements of the EPA's *Guidance Statement No. 18: Prevention of Air Quality Impacts from Land Development Sites*.

It is noted that dust may arise from ongoing activities within precincts such as transport depots and stockpiles within the HVWRA. These activities will also be managed so as to comply with the requirements of the abovementioned Guidance Statement.

Potential light overspill within the HVWRA should be required to be managed with the design of lighting systems in accordance with AS4282-1997 and the recommended limits.

Management provisions for potential pollutants are provided for in the Proposed Master Plan to ensure that adverse affects are avoided.

Section 7.4.1 of the Proposed Master Plan states that with each Development Application:

*An applicant shall submit sufficient information to enable the Commission to assess each application in accordance with the Statement of Environmental Intent, the Environmental Objectives, the Environmental Development Requirements, the other environmental provisions of this Part and all relevant standards and legal requirements and show how these will be met.*

Part E of 7.4.2 is specifically related to other potential pollutants:

*The management and mechanisms through which by-products and emissions such as noise, dust, odour, particulates, light, effluent and solid wastes are prevented, minimised, stored, transported and disposed of, and demonstration that all relevant standards recognised in Western Australia will be met.*

Furthermore, the Planning Strategy makes provisions for minimising emissions and wastes in Section C 2.4.3 of the Proposed Master Plan Report stating:

*Land uses that may result in air, soil or water contamination/pollution must not be permitted unless it can be demonstrated that the proposed activities will not result in contamination above acceptable ecological and health investigation levels.*

The International Commission on Radiological Protection (ICRP) has set the following limits on exposure to ionizing radiation:

- The general public shall not be exposed to more than 1 mSv per annum (over and above natural background); and
- Occupational exposure shall not exceed 20 mSv per annum.

These limits exclude exposure due to background and medical radiation (ARPANSA, 2003b).

Compliance with the Radiation Protection Series should ensure that the above limits on exposure are not exceeded, thus maintaining human and environmental health. In addition to the Radiation Protection Series, the following is included in the Proposed Master Plan text to:

7.2 *Land in the Redevelopment Area is intended to be developed and managed in such a manner as to:*

*(a) prevent any potential adverse environmental impacts, including those related to health and amenity, extending beyond the Redevelopment Area.*

Section 7.4.1 of the Proposed Master Plan states:

*An applicant shall submit sufficient information to enable the Commission to assess each application in accordance with the Statement of Environmental Intent, the Environmental Objectives, the Environmental Development Requirements, the other environmental provisions of this Part and all relevant standards and legal requirements and show how these will be met.*

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Section 7.4.2 requires information to be submitted which includes the following (please note that this is not a complete list of required information):

- *Description of all developments, processes and activities to be carried out on the land;*
- *Description of the potential for these developments, processes and activities to impact on the environment and people;*
- *A list of all products, by-products, wastes and emissions to be directly or indirectly generated;*
- *The management and mechanisms through which by-products and emissions such as noise, dust, odour, particulates, light, effluent and solid wastes are prevented, minimised, stored, transported and disposed of, and demonstration that all relevant standards recognised in Western Australia will be met;*
- *A list of any dangerous and hazardous goods to be used or stored on, or transported to or from the site;*
- *The management and mechanisms through which dangerous and hazardous goods must be used, stored or transported, including emergency spill management and disposal;*
- *The societal and environmental risks of any hazardous activity or substance and the mechanisms through which risk will be prevented or managed to an acceptable level;*
- *Management of the potential conflict between incompatible land uses and activities;*
- *Site contamination assessment, and remediation action plan where necessary.*

Including the above information in Development Applications should assist in ensuring adverse impacts are avoided.

#### 6.5.6 Proposed Outcome

With due regard to the planning principles underlying the HVWRP, the provisions within the Proposed Master Plan and legislative environmental management capabilities, the EPA's objective for the Other Potential Pollutants factor is able to be met.

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## 7.0 ENVIRONMENTAL ASSESSMENT – SOCIAL SURROUNDINGS

### 7.1 Risk

#### 7.1.1 Preliminary EPA Objective

To ensure that risk from the proposal is as low as reasonably achievable and complies with acceptable standards and EPA criteria.

#### 7.1.2 EPA Scope of Work

*How will risk levels in the scheme area be maintained at acceptable levels? How will adverse impacts on sensitive land uses within and outside the scheme area potentially arising from land use and development in the scheme area, be avoided?*

Indicate existing levels of risk experienced in scheme area, sources of risk, and any issues related to risk.

Discuss any potential issues – discuss the potential for future levels of risk that may affect the scheme area. Discuss the potential for activities in the scheme area to increase risk levels outside the scheme area. Consider the transport of dangerous goods and hazardous materials.

Propose scheme measures to address risk, to complement other processes.

#### 7.1.3 Existing Environment and Policies

For reference, the following definitions of risk are provided in the HVWRP Proposed Master Plan:

- “Risk - individual” means the risk that any one member of the general public will be injured or killed as a result of an unintended incident or hazardous event;
- “Risk - societal” means the risk that a number of people will be injured or killed as a result of an unintended incident or hazardous event;

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- “Risk – environmental” means the risk that the natural or built environment will be damaged as a result of an unintended incident or hazardous event.

The *Guidance for Risk Assessment and Management: Off-site individual risk from Hazardous Industrial Plant No. 2* was published by the Western Australian EPA in 2000 (EPA, 2000c) and specifically addresses off-site individual risk criteria for fatalities from hazardous industrial plant. The Guidance provides information that the EPA will consider when assessing proposals where off-site risk is a relevant environmental factor in an assessment to ensure the off-site individual risk from new hazardous industrial plant is assessed and managed to assure public safety. It takes into account:

- the factor of risk assessment and management of off-site individual risk from the hazardous industrial plant as a major environmental determinant in the environmental impact assessment (EIA) process in Western Australia; and
- protection of the environment as defined by the *Environmental Protection Act 1986* (WA) with focus on people and the environment. (EPA, 2000c)

The EPA has set the off-site individual risk criteria for fatalities at the following levels:

- A risk level in residential area of one in a million per year or less,
- 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,
- 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 levels imposed upon an industry should not exceed a target of one hundred in million per year,
- A risk level for any non-industrial activity or active open spaces located in buffer areas between industrial facilities and residential areas on ten in a million PER year or less, and

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- (e) A risk level for commercial developments, including offices, retail centres, showrooms, restaurants and entertainment centres, located in buffer areas between industrial facilities and residential areas, of five in a million per year or less.

In addition to meeting the above criteria, risk minimisation must be demonstrated in all new proposals.

The Australian/New Zealand Standard 4360 – Risk Management provides a generic guide for the establishment and implementation of the risk management process involving the identification, analysis, evaluation, treatment and ongoing monitoring of risks. Risk management is recognised as an integral part of good management practice. It is an iterative process consisting of steps, which, when undertaken in sequence, enable continual improvement in decision-making.

The Standard provides a generic guide for establishing and implementing the risk management process that involves establishing context, identification, analysis, evaluation, treatment, monitoring and review and consultation and communication. This Standard may be applied at every stage in the life of an activity, function, project or asset generated by any public, private or community enterprise or group.

The Western Australian EPA published the Draft EPA *Guidance Statement No. 50: Achieving EPA Risk Criteria for Development in Proximity to Existing and Proposed High Pressure Gas Transmission Pipelines* (EPA, 2000d). This Guidance Statement specifically addresses the factor of public risk assessment and management, of off-site individual risk from high pressure gas transmission pipelines as a significant environmental determinant in the environmental impact assessment process in Western Australia. The Guidance provides information that the EPA will consider when assessing proposals in proximity to high pressure gas pipelines. It takes into account:

- (a) protection of the environment as defined by the *Environmental Protection Act 1986* (WA) with a focus on people and the environment; and
- (b) the need to ensure that land uses and people adjacent to high pressure gas pipelines are not exposed to unacceptable levels of risk.



The EPA's objectives as published in Draft Guidance Statement No. 50 are to ensure that when a land use is changed adjacent to an existing high pressure gas transmission pipeline, or when a new (or upgraded) high pressure gas transmission pipeline is proposed to be installed adjacent to existing land uses:

- the level of risk for adjacent land uses meets the EPA individual risk criteria; and
- that ALARP (As Low As Reasonably Practicable) requirements are met such that:
  - risk mitigation measures are implemented;
  - separation from the high pressure gas pipeline is achieved; and
  - management of the high pressure gas transmission pipeline and easement is modified to account for the changes.

In EPA Bulletin 949 - Kwinana International Motorplex (EPA, 1999b), the EPA adopted the position that the issue of societal risk is largely a planning matter. It would therefore not formally assess societal risk provided that the proponent made available to the public an adequate document addressing the issue, including emergency response.

Section 7.1.5 of this document contains excerpts from Section 7.3.6 of the Proposed Master Plan regarding Land Use Capability and Risk. It is considered that in demonstrating that Section 7.3.6 of the Proposed Master Plan can be met, that the above EPA position is adequately met.

The draft EPA document *Guidance Statement No. 50: Achieving EPA Risk Criteria for Development in Proximity to existing and Proposed High Pressure Gas Transmission Pipelines* establishes guidelines for separation distances between high-pressure gas transmission pipelines and development. The following guidance is provided in Section 3.3.2 of the Guidance Statement:

“Consistent with the recommendations in EPA Draft Policy No. 3 ‘Industrial Residential Buffer Areas (Separation Distances),’ proposals that achieve a minimum 300m separation distance from the high pressure gas transmission pipeline to areas where people reside or groups of people can congregate, need not be referred to the EPA.

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HB 105 (1998) says the operating authority should consider changes in land uses ‘...within a distance in metres equal to the pipeline diameter in millimetres...’. This distance can also be used as a guide by planning authorities when considering major changes in land use for secondary and tertiary pipelines, to ensure the pipeline operator and authority is consulted.

The EPA acknowledges that certain land uses can be located closer than 300m, based on risk rather than consequence distances, provided that the risk is mitigated through the application of specific construction and management measures to the high pressure gas transmission pipeline.”

#### 7.1.4 Existing Environment and Potential Impacts

Primarily, risk in the area is generated by industry within the KIA. The KIA is located south of the HVWRA and is the primary industrial area for Western Australia. The majority of the HVWRA is within the Kwinana EPP Buffer, providing a transition between the KIA and surrounding areas in which new residential areas and other sensitive developments are generally not supported.

The manufacture and transport of a range of materials in the KIA creates a level of risk. Modelled risk contours of Individual Fatality Risk (IFR) outlines the unacceptable risk area for a fully developed KIA, in 2020, extending into the south-western quarter of the HVWRA (Figure 10). It is noted that the highest contour shown for cumulative level of risk from the KIA extending into the HVWRA is 100 in a million per year. The EPA’s criteria for cumulative risk imposed upon an industry is that the level should not exceed a target of one hundred in a million per year.

Electrical power infrastructure services in the area are substantial and comprise a combination of distribution and transmission lines - underground and overhead with the vast majority as overhead lines. A variety of transmission lines run through and service the HVWRP - 330kV and 132kV high-voltage transmission lines, 66kV and 22kV medium to low-voltage distribution lines, underground power and an intensive local network of 11kV lines (Figure 26).

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Varying size easements are associated to these lines that constrain their immediate surrounding land uses. The main 132kV and 330kV transmission lines run east-west from the Kwinana Power Station to the east metropolitan area. Two 132kV lines, one of which has been built to a 330kV standard, and one 330kV line also run in an east-west direction. Normally a 132kV line carries a 26m easement and 330kV lines have a 60m easement associated with them. Through the majority of the HVWRP, however, the three lines run in close proximity to each other and the easement has been rationalised in this area to a single 120m width. There are several 132kV lines running north-south, which are used for transmission from the Kwinana Power Station to the main metropolitan grid. The easements on these lines vary from 16m to 26m. One line currently has a 16m easement but there are plans to upgrade this line within the next 10 years, with the easement increasing to 20 - 24m. The 66kV lines have a common easement of 13m. These lines act more like distribution lines rather than transmission. The 22kV and 11kV lines can be found throughout the HVWRP and have no assigned easements and generally coincide with local access roads. Location of transmission lines and associated easements are shown on Figure 26.

Small areas of underground power exist in the HVWRA, with short runs installed as a requirement of new developments. These areas have both higher and lower-voltage distribution lines, with easements of 9.6m and 3m respectively. Due to the high cost of burying, relocating and/or consolidating powerlines, much of the existing infrastructure is proposed to remain the same. Future technological advances and variations in cost may enable changes to occur at a later stage of development. Location of underground power infrastructure is shown on Figure 26.

The gas supply network within the HVWRA comprises Alinta, CMS Energy and Epic Energy pipelines. Epic Energy and CMS Energy high-pressure gas transmission pipelines are located in the HVWRA. The pipelines contribute to a level of risk within the HVWRA and require a buffer between land uses and restricted activities within their vicinity. The level of risk varies depending upon the characteristics of the pipe, pressure, burial depth and level of activity within the pipeline easement. The location of these pipelines is shown on Figure 27.

Alinta lines are the distribution mains for the properties in the area and are predominantly located within road reserves. Where a line runs through private property a five metre easement is required.

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CMS and Epic Energy have high-pressure pipelines that function as transportation service providers for AlintaGas and the KIA. The CMS line carries Dongara field gas. The Epic Energy pipeline (known as the Russell Road lateral) carries North-West Shelf gas.

BP has three oil lines running through the HVWRA, which travel north to the Fremantle Port and Perth Airport. One line follows the rail reserve, the others are along Rockingham Road. All the oil lines have a 15m easement associated with them. Figure 28 shows the location of all infrastructure constraints within the HVWRA.

Existing industry within the HVWRA such as the Henderson Landfill contribute to levels of societal, individual and environmental risk. The large numbers of patrons that are intermittently present at the Motorplex complex to the south of the HVWRA needs to be considered during the assessment of development within the HVWRA as large congregations of people in one concentrated area increases societal risk levels. It is unclear as to what precise levels of risk are created as a result of the Motorplex complex and industry within the site, and the impact this has on the HVWRA.

In addition new industries that propose to locate within the HVWRA may potentially increase the levels of individual, societal and environmental risk within the HVWRA. Particular industrial processes and storage of particular amounts of chemicals and materials can result in an increased level of risk requiring management through separation distances or other means (refer Table 4.4). For example increased levels of risk could be created by proposed fuel depots allowable within some of the precincts (refer Table 4.4). The risk of cumulative impacts needs to be considered during assessment (for example a proposed fuel depot located within Precinct 1 which is within the KIA risk contours and close to the Motorplex complex).

Figures 4 and 29 show existing and proposed transport networks within the HVWRP, together with road and rail freight routes. Depending on the type of goods being transported, levels of individual, societal and environmental risk within the HVWRA are likely to be affected. It can be expected that hazardous goods will be transported through the HVWRA and adjoining areas. Figure 30 shows all transport constraints within the HVWRA.

The area that requires some priority in terms of acquisition and development is the Hope Valley Township. It is clear that the current residential land use within this

township is at significant odds with its surrounding land use in terms of individual and societal risk. The fact that many residents do not have access to scheme water and live in the shadow of the Motorplex and the Kwinana Industrial Area has been considered justification to initiate transition of the township.

#### 7.1.5 Proposed Management

The Project Objectives to improve and protect the environment and minimise land use conflicts can be achieved by locating similar industries together, the formation of joint ventures where there is the ability to reduce emissions, reduce or overlap buffers, restrict and or reduce risk and enable the trading of emission quotas/licences to others. The EPA risk criteria for Individual Risk of Fatality for Industrial Facilities is that risk levels should not exceed a target of 50 in one million per year at the site boundary for each individual industry. This criterion should be taken into account at Development Application stage.

Rationalisation of pipeline easements helps to minimise land take and land use conflict through establishing multiple infrastructure corridors. However, the opportunity to rationalise pipeline easements is limited and unlikely, primarily due to the high cost compared with the net benefits derived.

Easement widths associated with gas lines, specifically high-pressure lines, allow access for operational and maintenance activity by the pipeline operators. Easements limit the nature, type and distance of activity within their proximity. It is noted that easements do not act as buffers to mitigate risk and are not adequate to do so in many cases.

Management of risk within the HVWRA should result from the setting of conditions through Development Applications. These conditions should take into account, where appropriate, a Quantitative Risk Assessment that establishes appropriate buffers and management provisions.

Precedents exist where the generic buffer distance of 300m for High-Pressure Gas Transmission pipelines may be reduced. These precedents utilised pipeline protection measures to ensure that ALARP requirements were met:

- (a) concrete footpath over the pipeline;

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- (b) added sign posting;
- (c) reduced utility service (water etc) crossings;
- (d) continual pipeline surveillance by the pipeline operator every week; and
- (e) planned procedures for adjacent construction subdivision work.

During the staged redevelopment of the HVWRA, there is the potential for some or all of the gas lines to be encased or capped to reduce their associated risk and their respective buffer widths, which will increase the area of developable land. Detailed design and planning will need to be undertaken by developers in conjunction with the responsible utility as part of each precinct structure plan and/or subdivision to optimise infrastructure and performance.

The potential exists for industrial development within the HVWRA to encroach on pipelines within the area. This should be avoided at the precinct planning stage of development. Assessing the proximity of pipelines in relation to each precinct should occur in conjunction with pipeline operators.

At this stage of the development of the HVWRA, a firm quantification of risk cannot be undertaken. This is due to the lack of quantitative information regarding risk levels associated with existing industry within the HVWRA, the Motorplex, and dangerous or hazardous goods to be transported on road and rail freight transport routes, and the proximity of proposed development to High Pressure Gas Transmission Pipelines. It is not possible to conduct conclusive risk studies within the HVWRA without knowing the exact industries that will be located in each precinct.

As development proceeds within the HVWRA, it will be therefore be necessary to consider risks associated with land uses as part of cumulative and individual risk assessment. The planning approval system will take cognisance of societal and individual risk in its assessments and may require that a societal and individual risk study be undertaken as part of the risk assessment of new proposals. Societal risk is a potential issue for places where groups of people may congregate, such as the Motorplex.

The planning authority will require as appropriate detailed Quantitative Risk Assessments as part of Development Applications for precincts which have High-Pressure Gas Transmission Pipelines located within, or in close proximity to them, or for developments associated with risk levels.

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Comprehensive provisions exist in the Proposed Master Plan to ensure that individual, societal and environmental risk is managed to the requirements of the EPA. These are outlined below:

### 7.3.6 Land Use Compatibility and Risk

*Land use and development within the Redevelopment Area shall be carried out and managed in such manner as to ensure that the safety and amenity of surrounding land uses, employees and the general public is provided, while having regard to the rights of the community, landowners and developers, and shall:*

- (a) incorporate an evaluation of the potential for conflict with incompatible neighbouring land uses, their activities and any associated risk, including but not limited to high-pressure gas pipelines, high-voltage electric transmission lines and major roads;*
- (b) incorporate risk minimisation and compliance with off-site risk criteria, demonstrated through quantitative risk assessment;*
- (c) not incorporate land uses and development that may result in excessive individual, societal or environmental risk, unless it can be demonstrated that the risk can be adequately managed;*
- (d) not create significant individual or cumulative off-site environmental or social impacts or unduly disrupt or adversely affect neighbouring developments;*
- (e) not incorporate development that may prevent, inhibit or adversely affect other permissible land uses or developments, in accordance with Part 11 of the Master Plan, unless it can be demonstrated through adequate provisions that no unacceptable influences are exerted;*
- (f) be conducive to surrounding land uses and provide a transitional buffer between the residential areas surrounding the Redevelopment Area and heavy industry within the Kwinana Industrial Area; and*

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- (g) *have regard for the requirements of the Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999, the Statement of Planning Policy No. 4: State Industrial Buffer Policy, EPA's Draft Guidance No 3: Industrial-Residential Buffer Areas (Separation Distances) or their current equivalents, and any other relevant requirements.*

Specific sections of the Environmental Objectives within the Proposed Master Plan also ensure that the EPA's objectives regarding Risk are met:

## 7.2 Environmental Objectives

*Land in the Redevelopment Area is intended to be developed and managed in such a manner as to:*

- a) *prevent any potential adverse environmental impacts, including those related to health and amenity, extending beyond the Redevelopment Area;*
- (g) *appropriately store, transport and use all dangerous and hazardous goods in accordance with the manufacturer's recommendations and regulatory requirements; and*
- (q) *prevent unacceptable levels of individual, societal or environmental risk.*

### 7.1.6 Proposed Outcome

With due regard to the planning principles underlying the HVWRP, the provisions within the Proposed Master Plan and legislative environmental management capabilities, the EPA's objective for Risk is able to be met.

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## 8.0 DEFERRED FACTORS

In the Instructions for the preparation of the ER, the EPA identified other environmental factors which it considers to be relevant to the HVWMP but are likely to be most appropriately addressed at a later stage. These factors are called “deferred environmental factors”.

These include environmental factors for which information was not available at the time of the environmental impact assessment.

If the deferred factor at the appropriate later stage of planning is not fully considered and protected through suitable location, design, management and legally enforceable requirements, then the formal assessment process may be applied by the EPA at the later stage of planning.

Deferred factors have been identified in relation to potential emissions from individual land uses and developments, and precinct 13, as discussed below.

### 8.1 Emissions from individual land uses and developments

Clearly information is not available at this time on individual development proposals that may in future seek to locate in the HVWRA.

Generally, where individual proposals will comply with the objectives, policies and criteria specified in the scheme as finally gazetted, these are not expected to be subject to the formal environmental impact assessment process. It is expected that new industries will be located and managed to avoid the potential for significant individual and cumulative pollution e.g. noise, risk and other potential pollutants.

However, there remains the potential for some industries or land uses to be proposed in the Proposed Master Plan area that may raise a significant individual or cumulative pollution emission or risk issue.

Applying the concept of “deferred factors”, the EPA would retain the ability to assess proposals under Part 1V of the *Environmental Protection Act 1986* that are associated

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with potentially significant pollution, emissions or risk arising from or affecting land use and development in the Master Plan area.

## 8.2 Precinct 13

The Proposed Master Plan states that the ultimate outcome of land uses in Precinct 13 will be determined through the statutory public comment and assessment period for the Proposed Master Plan. The Environmental Protection Authority and the Western Australian Planning Commission have determined that uses that may compromise the outcomes of the Review of the Kwinana Air Quality Buffer will not be supported.

Outcomes may also be influenced by the final findings of the buffer review. The status of the buffer review is outlined in Section 6.1.5. The EPA in the Instructions for the ER stated:

“The acceptability of some land uses (eg residential, child care, accommodation) in this precinct is also dependent on the outcome of the Kwinana air quality buffer review and related studies. It has been the EPA’s position that sensitive land uses are generally not appropriate in this area as it is within Area B of the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999*.

The range of land uses for Precinct 13 that the Proposed Master Plan considers may be contemplated without compromising the Buffer review include but are not limited to the following:

- Rural - status quo (though some sensitive uses may depend on the outcome of the buffer review)
- Light and General Industry
- Service Industry
- Medical Centre/Offices

The Proposed Master Plan also states that an objective of Precinct 13 will be to assist in the creation of a transition between development within the Redevelopment Area and surrounding land uses, and provide a buffer for the Kwinana Industrial Area. There will therefore be a presumption against increasing the intensity of residential development.

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The public is actively encouraged to make submissions on any or all of these land uses.

Pending the outcome of the public submission period and the review of the Kwinana air quality buffer and related studies, there is scope for the issue of air quality impacts on sensitive development to be dealt with as “a deferred factor” in Precinct 13.

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## 9.0 CONSOLIDATED PROPOSED MASTER PLAN PROVISIONS AND DESIGNATIONS

The Hope Valley-Wattleup Redevelopment Project Proposed Master Plan reflects an intention to facilitate the detailed planning and development of a regional industrial location of strategic importance. This Environmental Review has described and discussed a wide range of environmental issues and potential environmental impacts associated with the proposed implementation of the Proposed Master Plan. This Review has also identified the range of management measures proposed within the Proposed Master Plan to ensure these environmental issues are addressed and managed in subsequent planning processes.

Environmental management measures are contained within the:

- (i) Proposed Master Plan Text;
- (ii) Planning Strategy; and
- (iii) Planning Policies.

The relationship between the Proposed Master Plan, the Planning Strategy and the Planning Policies is outlined as follows:

- the Planning Strategy expands on FRIARS by providing strategic directions for the Redevelopment Project and is not intended to impose any requirement but rather guide more detailed components of the land use planning framework for the project, such as the Proposed Master Plan Text and Maps (similar to a local planning strategy).
- the Proposed Master Plan (Text and Maps) are prepared to fulfil the requirements of the *Hope Valley-Wattleup Redevelopment Act 2000* and provide the primary controls of land use and development, and also provide for the creation of policies and design guidelines (similar to a town planning scheme).
- the Policies and Design Guidelines are subservient to the above and are intended to provide a more detailed layer of guidance of land use and development in the Redevelopment Area.

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According to the *Hope Valley-Wattleup Redevelopment Act 2000* and the Proposed Master Plan, the WAPC is to have regard for the provisions of the Proposed Master Plan, policies and design guidelines when considering applications for approval to undertake development within the Redevelopment Area.

The following section is a consolidated reproduction of the provisions related to environmental management contained in the above documents and this ER.

## **Provisions within the Proposed Master Plan Text**

### **1.7 The aims of the Proposed Master Plan**

The aims of the Proposed Master Plan are to:

- (a) protect the Kwinana Industrial Area (hereafter referred to as the KIA) by resolving surrounding land use conflicts;
- (b) protect significant heritage in the Redevelopment Area;
- (c) conserve areas of local and regional environmental significance;
- (d) minimise sources of pollution;
- (e) distribute the cost of common infrastructure;
- (f) ensure the development and use of land within the Redevelopment Area complies with accepted standards and practices;
- (g) ensure that future development and use of land within the Redevelopment Area occurs in a proper and orderly way;
- (h) promote sustainable development;
- (i) facilitate development generally in accordance with the *Fremantle-Rockingham Industrial Area Regional Strategy* (Final Report, April 2000).

## **5.4 Environmental Conditions**

- 5.4.1 Environmental conditions to which the Proposed Master Plan is, or amendments to the Proposed Master Plan are subject are incorporated into the Proposed Master Plan by Schedule 8 of the Proposed Master Plan.
- 5.4.2 Where appropriate, the environmental conditions are indicated on the Proposed Master Plan Map by the symbol EC to indicate that environmental conditions apply to the land.

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5.4.3 The Commission must —

- (a) maintain a register of all relevant statements published under Sections 48F and 48G of the Environmental Protection Act; and
- (b) make the statements available for public inspection at the relevant offices of the Commission and the Authority.

Note: Environmental conditions are those required to be incorporated into a Proposed Master Plan or an amendment to a Proposed Master Plan following assessment under the *Environmental Protection Act 1986*.

5.4.4 The Commission must be satisfied that land in the Redevelopment Area will be developed in accordance with any relevant environmental conditions, the provisions in Part 7 of the Proposed Master Plan relating to the environment and any Planning Policy relating to the environment prepared in accordance with clause 2.4 of the Proposed Master Plan.

## 6.2.6 Details of proposed structure plan

6.2.6.1.A proposed structure plan is to contain the following details:

- (a) A map showing the area to which the proposed structure plan is to apply;
- (b) A site analysis map showing the characteristics of the site including:
  - (i) Landform, topography and land capability;
  - (ii) Conservation and environmental values including remnant vegetation following survey in accordance with EPA *Guidance Statements No 51 and 56*, wetlands, damplands, streams and water-courses (foreshore reserves) and any environmental policy areas;
  - (iii) Hydrogeological conditions, including approximate depth to water table;
  - (iv) Sites and features of Aboriginal and European heritage value;
- (c) A context analysis map of the immediate surrounds to the site including:
  - (i) The pattern of existing and planned local, town and regional centres;



- (ii) Transport routes, including freeways, arterial routes and local connector alignments, public transport routes, strategic cycle routes, bus stops and rail stations;
  - (iii) Existing and future land use.
- (d) A structure plan map showing proposals for:
- (i) Natural features such as water courses and vegetation;
  - (ii) The pattern of town and neighbourhood centres;
  - (iii) Street network including street types;
  - (iv) Street block layouts;
  - (v) Transportation corridors, public transport network, and cycle and pedestrian networks;
  - (vi) The pattern and disposition of land uses;
  - (vii) Existing and proposed commercial centres;
  - (viii) Community facilities;
  - (ix) Open space and parklands; and
  - (x) Water management areas;
- (e) A written report to explain the mapping and to address the following:
- (i) The planning framework for the structure plan and any Planning Policies and Design Guidelines, strategies, and Proposed Master Plan provisions which apply to the land, and any environmental conditions which apply under the Master Plan;
  - (ii) The site analysis including reference to the matters listed in clause 6.2.6.1 (b) above, and, in particular, the significance of the conservation, environmental and heritage values of the site;
  - (iii) The context analysis including reference to the matters listed in clause 6.2.6.1 (c) above;
  - (iv) How planning for the structure plan area is to be integrated with the surrounding land;



- (v) The design rationale for the proposed pattern of subdivision, land use and development;
- (vi) Traffic management and safety;
- (vii) Parkland provision and management;
- (viii) Water management;
- (ix) Proposals for public utilities including sewerage, water supply, drainage, gas, electricity and communication services;
- (x) The proposed method of implementation including any cost sharing arrangements and details of any staging of subdivision and development.

## Part 7 – Environment

### 7.1 Statement of Environmental Intent

It is intended that land in the Redevelopment Area be developed in accordance with best known environmental practice, as follows.

- (a) The nature of industrial development is to be conducive to surrounding land uses outside the Redevelopment Area;
- (b) The Redevelopment Area is to comprise a transitional buffer between the residential areas to the north and east and the heavy industry within the KIA.
- (c) The use or development of land is not to have individual or cumulative adverse environmental or social impacts on:
  - residential areas outside the Redevelopment Area;
  - other land uses and amenities within or outside the Redevelopment Area;
  - Conservation Category Wetlands or any sensitive environments within or outside of the Redevelopment Area;
  - Cockburn Sound;
  - Soil, groundwater and surface water;
  - Air quality; and
  - Future land uses within and surrounding the Redevelopment Area.

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## 7.2 Environmental Objectives

Land in the Redevelopment Area is intended to be developed and managed in such a manner as to:

- (a) prevent any potential adverse environmental impacts, including those related to health and amenity, extending beyond the Redevelopment Area;
- (b) facilitate the establishment of a transitional buffer between the relevant residential and heavy industrial areas;
- (c) support the protection of sensitive environments and areas of environmental significance within and outside the Redevelopment Area, including Beeliar wetlands, Cockburn Sound, Long Swamp and *Bush Forever* sites;
- (d) ensure that the aquifer is managed in a sustainable manner and that groundwater quality is maintained or improved;
- (e) provide for on-site retention and infiltration of uncontaminated storm-water;
- (f) prevent accidental loss or release of effluent or waste from premises;
- (g) appropriately store, transport and use all dangerous and hazardous goods in accordance with the manufacturer's recommendations and regulatory requirements;
- (h) protect the water quality of Cockburn Sound by ensuring that no inappropriate level of nutrient load or other contamination leaves the Scheme Area and enters the Sound;
- (i) dispose of sewage and compatible wastes by connecting to a comprehensive sewerage system, or utilising an accepted alternative treatment system only when no comprehensive sewerage system is available;
- (j) ensure no significant net increase of emissions, such as noise, dust, particulates, odour, other air emissions, litter or light, occur in or extend beyond the Scheme Area;
- (k) ensure that the generation or release of any emissions is kept within acceptable health levels;
- (l) maintain and/or enhance linkages between fauna habitats and vegetation communities - such as remnant vegetation, reserves and wetlands - to facilitate connectivity, accessibility and interaction of species;

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- (m) implement and support environmental best practice;
- (n) prevent the contamination of soil and water that exceeds allowable ecological or health levels;
- (o) prevent contaminated soil or water interacting with and entering surface or groundwater flows and extending beyond the Redevelopment Area boundary;
- (p) minimise the impact of surface runoff so as to protect and maintain the integrity, functions and environmental values of natural catchments, hydrological systems and wetlands, within and adjacent to the Redevelopment Area;
- (q) prevent unacceptable levels of individual, societal or environmental risk;
- (r) protect, maintain and enhance air quality;
- (s) promote energy-efficient practices and processes;
- (t) minimise land use incompatibility; and
- (u) optimise development potential in an environmentally acceptable way.

## 7.3 Environmental Development Requirements

### 7.3.1 Site Contamination

Land use and development within the Redevelopment Area shall be carried out and managed so as to prevent site contamination, and in the case of existing contamination, is to be suitably managed and remediated for future use, in accordance with the following:

- (a) The use or development shall not result in soil or water contamination or pollution above acceptable ecological and health investigation levels.
- (b) Prior to the use or development of land, an applicant shall advise the Commission of the land use or development history of the land, for the purpose of preliminary site contamination assessment.
- (c) Where contamination above acceptable ecological and health investigation levels is suspected or detected, assessment, remedial works (if required) and validation of remediation shall be undertaken by suitably qualified persons in accordance with recognised State requirements.

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- (d) Land the subject of remedial works shall not be developed or used for its intended purpose until the Commission receives certification that the remedial works are complete.
- (e) Any land contamination shall be fully contained on site and managed by appropriate procedures, including emergency spill management and disposal.

### 7.3.2 Water Resource Management

Land use and development within the Redevelopment Area shall be carried out and managed so as to minimise the disturbance and contamination of water catchments and groundwater through the appropriate siting, design, and management of development, in such manner as to:

- (a) maintain the quality and quantity of water resources sufficient for existing and future environmental and human use;
- (b) maintain, and where practicable, improve surface and groundwater quality through water-sensitive design and management;
- (c) make provision for drainage systems that optimise the retention, consumption and/or infiltration of drainage on site;
- (d) avoid the potential for the intensification of flooding as a result of inappropriately located land uses and development;
- (e) where industrial processes create liquid effluent, incorporate on-site containment, management, contaminant stripping and appropriate disposal;
- (f) not affect the flow or quality of surface or groundwater on neighbouring land;
- (g) be connected to a comprehensive sewerage system, with the exception of a single house where no such system is available;
- (h) utilise, where practical, alternative wastewater disposal systems, including reuse and recycling;
- (i) have regard for the *State Water Quality Management Strategy for Western Australia 2000*, the *Statement of Planning Policy No.27 Public Drinking Water Source* and any other relevant advice; and
- (j) comply with the comprehensive Water Management Strategy for the redevelopment area.

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### 7.3.3 Wetlands

Land use and development within the Redevelopment Area shall be carried out and managed so as to maintain and enhance wetland quality and ecological function through suitable location of land uses and developments and implementation of appropriate management measures, as follows:

- (a) land use or development shall not adversely affect wetlands.
- (b) land use or development shall be set back from all wetlands according to a buffer which will be proposed by the Responsible Authority at the structure (Precinct) planning stage on a case-by-case basis in accordance with surveyed environmental characteristics and values, and proposed buffer treatments, and agreed with the EPA Service Unit prior to adoption and implementation
- (c) land used for agriculture that is likely to drain toward wetlands or coastal waters shall be managed to reduce or eliminate nutrient export from that land into the wetland or coastal waters.
- (d) in determining an application for land use or development, the Commission shall have regard for the *Wetlands Conservation Policy for Western Australia* 1997 or its current equivalent and any other relevant advice.
- (e) the hydrological characteristics and water requirements of wetlands likely to be influenced by the implementation of the development will be determined to enable appropriate water management.

### 7.3.4 Air Quality

Land use and development within the Redevelopment Area shall be carried out and managed such to ensure that any individual or cumulative atmospheric pollution generated during the construction or operation of any development does not adversely affect neighbouring land uses, developments, employees, the general public, or environmentally significant areas, and prevents any unacceptable level of atmospheric pollution encroaching outside the Redevelopment Area boundary. Such land use or development shall:

- (a) maintain and, where practicable, improve air quality through appropriate design and management;
- (b) implement the concepts of “best practice” emissions minimisation as described in “*Guidance for the Assessment of Environmental Factors - Implementing best practice in proposals submitted to the*

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*environmental impact assessment process, No 55, Draft*” (EPA 2003);

- (c) minimise potential conflicts between existing and potential future neighbouring land uses within the Redevelopment Area, and activities that generate atmospheric pollution;
- (d) in relation to land use or development that may result in atmospheric waste generation, include an air quality assessment;
- (e) not incorporate development that may result in atmospheric pollution such as dust, gaseous particulates, odour and light and will not adversely affect neighbouring land uses, employees, the general public or environmentally significant areas;
- (f) not incorporate land use or development that may result in contamination or pollution, unless it can be demonstrated that the proposed activities will not result in contamination above the acceptable ecological or health levels prescribed in the *National Environmental Protection Council (Ambient Air Quality) Measures*, or equivalent, and any other standards recognised in Western Australia;
- (g) incorporate appropriately designed and implemented systems that minimise the release, accidental or otherwise, of atmospheric waste emissions;
- (h) where industrial process may create dust, particulates or other atmospheric emissions, shall incorporate on-site containment, management, contaminant stripping and disposal;
- (i) facilitate reduced travel demand and adequate access to public transport and walking and cycling infrastructure;
- (j) incorporate energy efficiency in the siting and design of buildings;
- (k) incorporate the retention of existing vegetation and/or revegetation of places;
- (l) where practical, utilise alternative energy generation, including renewable energy; and
- (m) have regard for the relevant requirements related to atmospheric pollution of the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999*, the *Air Quality Management Plan for Perth 2000* and *Statement of Planning Policy No. 4: State Industrial Buffer Policy* or their respective equivalents and any other relevant requirements.

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### 7.3.5 Noise

Land use and development within the Redevelopment Area shall be carried out and managed in such manner as to ensure that any individual or cumulative noise generated during the construction or operation of any development does not adversely affect existing and potential future neighbouring land uses, developments, land uses, employees or the general public, and prevents any unacceptable level of noise encroaching beyond the Redevelopment Area boundary. Such land use or development shall:

- (a) maintain, and where practicable, reduce noise levels within the Redevelopment Area through appropriate design and management;
- (b) not incorporate development that may result in excessive noise emissions and will not result in adverse effects on existing and potential future neighbouring land uses, employees or the general public;
- (c) minimise potential conflicts between neighbouring land uses within the Redevelopment Area and activities that generate noise;
- (d) where development may result in noise generation, include a noise assessment report in accordance with recognised good practice as in EPA Guidance No. 8 and 14 as relevant;
- (e) not generate unacceptable noise levels outside the Redevelopment Area;
- (f) avoid the potential for the exacerbation of noise as a result of inappropriately located or managed development;
- (g) not incorporate land uses and development that may result in noise emissions that do not comply with the *Environmental Protection (Noise) Regulations 1997*, or the current equivalent;
- (h) where developments or industrial process would create excessive noise levels, incorporate provision for the design and implementation of noise abatement systems; and
- (i) have regard for the potential of their contribution to cumulative noise generation.

### 7.3.6 Land Use Compatibility and Risk

Land use and development within the Redevelopment Area shall be carried out and managed in such manner as to ensure that the safety and amenity of surrounding land uses, employees and the general public is provided, while having regard to the rights of the community, landowners and developers, and shall:

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- (a) incorporate an evaluation of the potential for conflict with incompatible neighbouring land uses, their activities and any associated risk, including but not limited to high-pressure gas pipelines, high-voltage electric transmission lines and major roads;
- (b) incorporate risk minimisation and compliance with off-site risk criteria, demonstrated through quantitative risk assessment;
- (c) not incorporate land uses and development that may result in excessive individual, societal or environmental risk, unless it can be demonstrated that the risk can be adequately managed;
- (d) not create significant individual or cumulative off-site environmental or social impacts or unduly disrupt or adversely affect neighbouring developments;
- (e) not incorporate development that may prevent, inhibit or adversely affect other permissible land uses or developments, in accordance with Part 11 of the Master Plan, unless it can be demonstrated through adequate provisions that no unacceptable influences are exerted;
- (f) be conducive to surrounding land uses and provide a transitional buffer between the residential areas surrounding the Redevelopment Area and heavy industry within the Kwinana Industrial Area; and
- (g) have regard for the requirements of the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999*, the *Statement of Planning Policy No. 4: State Industrial Buffer Policy*, EPA's Draft Guidance No 3: *Industrial-Residential Buffer Areas (Separation Distances)* or their current equivalents, and any other relevant requirements.

## 7.4 Environmental Information

7.4.1 An applicant shall submit sufficient information to enable the Commission to assess each application in accordance with the Statement of Environmental Intent, the Environmental Objectives, the Environmental Development Requirements, the other environmental provisions of this Part and all relevant standards and legal requirements and show how these will be met.

7.4.2 The information required under clause 7.4.1 shall include the following:

- (a) Information on the receiving biophysical environment, following surveys in accordance with EPA's Draft Guidance No 51 and 56, and any significant features or characteristics, in a local and regional context;

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- (b) Description of all developments, processes and activities to be carried out on the land;
- (c) Description of the potential for these developments, processes and activities to affect the environment and people;
- (d) A list of all products, by-products, wastes and emissions to be directly or indirectly generated;
- (e) The management and mechanisms through which by-products and emissions such as noise, dust, odour, particulates, light, effluent and solid wastes are prevented, minimised, stored, transported and disposed of, and demonstration that all relevant standards recognised in Western Australia will be met;
- (f) A list of any dangerous and hazardous goods to be used or stored on, or transported to or from the site;
- (g) The management and mechanisms through which dangerous and hazardous goods must be used, stored or transported, including emergency spill management and disposal;
- (h) The societal and environmental risks of any hazardous activity or substance and the mechanisms through which risk will be prevented or managed to an acceptable level;
- (i) Management of the potential conflict between incompatible land uses and activities;
- (j) Site contamination assessment, and remediation action plan where necessary;
- (k) Promotion of energy-efficient development and urban design incorporating such elements as energy-efficient building design and orientation of building lots for solar efficiency;
- (l) Demonstration of how surface drainage and stormwater management and the protection of groundwater quality is to be achieved;
- (m) Demonstration of how significant environmental areas such as wetlands, habitat corridors, remnant vegetation, reserves and conservation areas are to be protected;
- (n) Promotion of existing vegetation retention, revegetation, landscape enhancement and visual aesthetics;
- (o) Management plans and commitments for the minimisation or protection of any significant environmental factors, impacts or issues

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including a review of the Town of Kwinana's Draft Revegetation Management Plan for Long Swamp if applicable; and

- (p) Any other information the Commission considers may be required to assess the application in accordance with the environmental provisions of this Part.

7.4.3 Where the Commission requires, the applicant shall provide certification to the satisfaction of the Commission that the environmental information required in clauses 7.4.1 and 7.4.2 has been prepared or endorsed by a suitably qualified person.

## 10.2 Accompanying material

Unless the Commission waives any particular requirement every application for planning approval is to be accompanied by —

- (a) a plan or plans to a scale of not less than 1:500 showing —
  - (i) the location of the site including street names, lot numbers, north point and the dimensions of the site;
  - (ii) the existing and proposed ground levels over the whole of the land the subject of the application and the location, height and type of all existing structures, and structures and vegetation proposed to be removed;
  - (iii) the existing and proposed use of the site, including proposed hours of operation, number of employees and buildings and structures to be erected on the site;
  - (iv) the existing and proposed means of access for pedestrians and vehicles to and from the site;
  - (v) the location, number, dimensions and layout of all car parking spaces intended to be provided;
  - (vi) the location and dimensions of any area proposed to be provided for the loading and unloading of vehicles carrying goods or commodities to and from the site and the means of access to and from those areas;
  - (vii) the location, dimensions and design of any open storage or trade display area and particulars of the manner in which it is proposed to develop the same; and
  - (viii) the nature and extent of any open space and landscaping proposed for the site;
- (b) plans and elevations to a scale of no less than 1:200, and sections of any building proposed to be erected or altered and of any building it is intended to retain;

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- (c) details of any signage proposed to be erected on the site where signage, specifically the type of signage, is not exempted by an other part of the Proposed Master Plan;
- (d) Environmental information as per clause 7.3;
- (e) any specialist studies that the Commission may require the applicant to undertake in support of the application such as traffic, heritage, environmental, engineering or urban design studies; and
- (f) any other plan or information, or alternate scale of plan referred to under clause 10.2 (a) and (b), that the Commission may require to enable the application to be determined.

## 11.2 Matters to be considered by the Commission

The Commission in considering an application for planning approval is to have due regard to such of the following matters as are in the opinion of the Commission relevant to the application —

- (a) the aims and provisions of the Proposed Master Plan;
- (b) the requirements of orderly and proper planning including any relevant proposed amendment to the Proposed Master Plan, which has been granted consent for public submissions to be sought;
- (c) any approved Statement of Planning Policy of the Commission;
- (d) any approved Environmental Protection Policy under the *Environmental Protection Act 1986*;
- (e) any relevant policy or strategy of the Commission and any relevant policy adopted by the Government of the State;
- (f) any Planning Policy and/or Design Guidelines adopted by the Commission under clause 2.4, any heritage policy statement for a designated heritage area adopted under clause 8.2.2, and any other plan or guideline adopted by the Commission under the Proposed Master Plan;
- (g) in the case of land reserved under the Proposed Master Plan, the ultimate purpose intended for the reserve;
- (h) the conservation of any place that has been entered in the Register within the meaning of the *Heritage of Western Australia Act 1990*, or which is included in the Heritage List under clause 8.1, and the effect of the proposal on the character or appearance of a heritage area;

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- (i) the compatibility of a use or development with its setting;
- (j) any social issues that have an effect on the amenity of the locality;
- (k) the cultural significance of any place or area affected by the development;
- (l) the likely effect of the proposal on the natural environment and any means that are proposed to protect or to mitigate impacts on the natural environment;
- (m) whether the land to which the application relates is unsuitable for the proposal by reason of it being, or being likely to be, subject to flooding, tidal inundation, subsidence, landslip, bushfire or any other risk;
- (n) the preservation of the amenity of the locality;
- (o) the relationship of the proposal to development on adjoining land or on other land in the locality including but not limited to, the likely effect of the height, bulk, scale, orientation and appearance of the proposal;
- (p) whether the proposed means of access to and egress from the site are adequate and whether adequate provision has been made for the loading, unloading, manoeuvring and parking of vehicles;
- (q) the amount of traffic likely to be generated by the proposal, particularly in relation to the capacity of the road system in the locality and the probable effect on traffic flow and safety;
- (r) whether public transport services are necessary and, if so, whether they are available and adequate for the proposal;
- (s) whether public utility services are available and adequate for the proposal;
- (t) whether adequate provision has been made for access for pedestrians and cyclists (including end-of-trip storage, and toilet and shower facilities);
- (u) whether adequate provision has been made for access by disabled persons;
- (v) whether adequate provision has been made for the landscaping of the land to which the application relates and whether any trees or other vegetation on the land should be preserved;
- (w) whether the proposal is likely to cause soil erosion or land degradation;

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- (x) the potential loss of any community service or benefit resulting from the planning approval;
- (y) whether the proposal is in accordance with Part 7- Environment, of the Proposed Master Plan;
- (z) any relevant submissions received on the application;
- (za) the provisions of Part 7 of the Proposed Master Plan;
- (zb) the comments or submissions received from any authority or person consulted under clause 11.1; and
- (zc) any other planning consideration the Commission considers relevant.

### **Provisions contained within the Planning Strategy**

#### **Social**

Transition of land use that:

- Minimises social disruption during transition
- Maximises employment benefits for the region
- Protects significant heritage

The Proposed Master Plan will ensure existing significant heritage aspects are protected and a social transition strategy is prepared that addresses the concerns of the community as the existing land use changes. The community will be consulted and kept informed of the planning process.

#### **Environmental**

Environmentally sensitive development that:

- Minimises net emissions and waste
- Maintains or improves the quality of the receiving environment (air, land, water)
- Protects factors of environmental significance including:
  - Vegetation
  - Fauna
  - Wetlands
  - Groundwater and surfacewater
  - Cockburn Sound Marine Environment

The planning will address all environmental issues, including conservation of existing local and regional resources and minimising sources of pollution such that the existing environment is maintained or, where possible, improved. This will include addressing

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areas requiring remediation and the extraction of natural resources. The planning process will incorporate establishment of development guidelines and policies.

### Actions and Outcomes

#### *Actions:*

#### ■ **Minimise emissions and waste**

- Land uses that may result in air, soil or water contamination/pollution must not be permitted unless it can be demonstrated that the proposed activities will not result in contamination above acceptable ecological and health investigation levels.
- Land uses that may result in land contamination must demonstrate full on-site containment, appropriate management procedures, including emergency spill management and disposal.
- Where industrial processes create liquid effluent, they must include provision for on-site containment, management, contaminant stripping and appropriate disposal.
- The potential for the deterioration of air quality as a result of inappropriately located or managed development must be avoided and not permitted to extend beyond the HVWRA.
- Developments must have regard to the relevant requirements of the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999*, *Statement of Planning Policy No. 4: State Industrial Buffer Policy* and the EPA's *Guidance No 3: Industrial-Residential Buffer Areas (Separation Distances)*, or their respective equivalent.
- Developments must make provision for the design and implementation of systems that minimises the release, accidental or otherwise, of atmospheric emissions.
- Where industrial process would create dust, particulates or other atmospheric emissions, they must include provision for on-site containment, management, contaminant stripping and disposal.
- The potential for the exacerbation of noise as a result of inappropriately located or managed development must be avoided and not permitted to extend beyond the HVWRA.
- Land uses and development that may result in noise pollution must not be permitted unless it can be demonstrated that the proposed activities will not result in noise levels above acceptable levels in compliance with the *Environmental Protection (Noise) Regulations 1997*, or the current equivalent.
- Where developments or industrial process would create excessive noise levels, they must include provision for the design and implementation of noise abatement systems.

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- Developments must not be permitted that may prevent, inhibit or adversely effect other permissible land uses or developments, unless it can be demonstrated through adequate provisions that no unacceptable influences are exerted.
- All development must be connected to a comprehensive sewerage system, with the exception of any existing single house where no such system is available.

#### ■ Improve quality of receiving environment

- Redevelopment must be conducive to surrounding land uses and provide a transitional buffer between the surrounding residential areas and heavy industry within the KIA.
- The redevelopment must have no significant individual or cumulative off-site environmental or social impacts, and unduly disrupt or adversely affect neighbouring developments.
- Developments must recognise and consider potentially degraded land including contaminated land and develop processes to facilitate its rehabilitation for appropriate future use and land compatibility.
- Prior to a change in land use or development a preliminary site contamination assessment shall be undertaken. Where possible contamination is detected or suspected then sufficient assessment and remedial works must be undertaken to satisfy the WAPC and Department of Environment.
- Redevelopment must maintain and, where practicable, improve air quality through appropriate design and management.
- Redevelopment must maintain and, where practicable, reduce noise levels within the project area through appropriate design and management.
- Redevelopment must maintain and or enhance linkage between vegetation community and fauna habitats, such as remnant vegetation, reserves and wetlands, to facilitate connectivity, accessibility and interaction of species.
- Support the protection of sensitive environments and areas of environmental significance within and outside the project area, such as Beeliar wetlands, Cockburn Sound and *Bush Forever* sites.
- Land used for agriculture that is likely to drain toward wetlands or coastal waters must be managed to reduce or eliminate nutrient export from that land.
- Redevelopment must maintain and, where practicable, improve groundwater quality and quantity through water-sensitive design and management.

#### ■ Vegetation

- Large or quality pockets of remnant vegetation, including those along transport corridors (i.e. road reserves) have been retained.

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- Large portions of significant remnant vegetation will be retained and must be maintained and enhanced as habitat corridors, greenbelts, parks and recreational areas.
- These corridors, which support native vegetation, must be maintained and enhanced through revegetation, structured planting, landscaping and irrigation.
- Redevelopment must maintain and/or enhance linkage between vegetation community and fauna habitats, such as remnant vegetation, reserves and wetlands, to facilitate connectivity, accessibility and interaction of species.

#### ■ Fauna

- Redevelopment must maintain and/or enhance linkage between vegetation community and fauna habitats, such as remnant vegetation, reserves and wetlands, to facilitate connectivity, accessibility and interaction of species.

#### ■ Wetlands

- Land used for agriculture that is likely to drain toward wetlands or coastal waters must be managed to reduce or eliminate nutrient export from that land.
- Direct discharge to wetland must not be permitted. Prior to any stormwater entering a resource enhancement or multiple-use wetland it must first pass through an artificial wetland, swale, sediment basin or litter/contamination trap.

#### ■ Groundwater

- Redevelopment must maintain and, where practicable, improve groundwater quality and quantity through water-sensitive design and management.
- The intensification of flooding as a result of inappropriately located land uses and development must be avoided.
- Developments must make provision for drainage systems that optimise the retention, consumption and or infiltration of drainage on site.
- All development must be connected to a comprehensive sewerage system, with the exception of any existing single house where no such system is available.
- Where industrial processes create liquid effluent, they must include provision for on-site containment, management, contaminant stripping and appropriate disposal.
- Maintain and improve groundwater quality, aquifer integrity and yield.
- Developments must appropriately store, transport and use all dangerous and hazardous goods in accordance with the manufacturer's recommendations and regulatory requirements.

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## ■ Cockburn Sound

- Protect the water quality of Cockburn Sound by ensuring no increase in nutrient loads or other contamination leave the premises and enter Cockburn Sound.
- Redevelopment must maintain and, where practicable, improve groundwater quality and quantity through water-sensitive design and management.
- Developments must make provision for drainage systems that optimise the retention, consumption and or infiltration of drainage on site.
- All development must be connected to a comprehensive sewerage system, with the exception of any existing single house where no such system is available.
- Where industrial processes create liquid effluent, they must include provision for on-site containment, management, contaminant stripping and appropriate disposal.
- Developments must appropriately store, transport and use all dangerous and hazardous goods in accordance with the manufacturers recommendations and regulatory requirements.

### Outcomes:

- Effective policies to control wastes and emissions
- The Proposed Master Plan will make provisions for the protection of flora and fauna and sensitive wetlands
- Water quality in Cockburn Sound will not be affected adversely by development.

## ■ Water

### Actions:

- Consider the availability of water resources to ensure maintenance of water quality and quantity for existing and future environmental and human uses.
- Encourage and support sustainable alternatives during redevelopment.
- Encourage grey water re-use and dual-use corridors to collect and dispose of waste and stormwater to minimise demand on the sewerage system.
- Detailed design of a comprehensive water reticulation network is required for each precinct structure plan/subdivision in liaison with the responsible utility.
- Create seasonally dry artificial wetlands to provide areas for drainage run-off and grey water disposal that minimise land take.

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- Encourage use of wastewater and stormwater for irrigation of greenbelts, parks and sport/recreational facilities.
- Encourage use of wastewater for industry use.

**Outcomes:**

- Adequate water supply capacity is provided for development.
- Provide and encourage opportunities to improve the receiving environment.

■ **Sewerage**

**Actions:**

- Detailed design of a comprehensive sewer system is required for each precinct structure plan/subdivision in liaison with the responsible utility.
- Set aside land for up to 12 sewer pump stations to service the area. The sewer pump stations, each require an area of approximately 20m x 20m.
- Examine opportunity to design and develop an integrated system as part of the whole HVWRA redevelopment from commencement.

**Outcomes:**

- An adequate sewage disposal system is provided for development.

■ **Oil and Gas**

**Actions:**

- Maintain existing Alinta, CMS, Epic Energy and BP pipelines.
- Provide additional gas lines as required for development by utilising existing and proposed road reserves.
- Seek to rationalise pipeline easements to minimise land take and land use conflict through establishing multiple infrastructure corridors where possible.
- Minimise pipeline easements and risk through pipeline encasement and/or capping.
- Detailed design of a comprehensive reticulation network is required for each precinct structure plan/subdivision in liaison with the responsible utility.

**Outcomes:**

- Adequate gas capacity is provided for industrial development.

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- Provide opportunities to reduce the environmental impact of oil and gas infrastructure.

## **Provisions within Planning Policies**

### **Planning Policy 1.2 - Energy Conservation**

#### ***Preface***

Achieving sustainable development is one of the aims of the Hope Valley Wattleup Redevelopment Project. Accordingly, the Commission in association with the Authority, will promote, encourage – and in some instances require, high standards of energy efficiency in building design and site layout.

#### ***Energy Conservation Principles***

Development should be designed wherever possible to incorporate or have regard for, natural lighting, solar access in winter and minimising solar impact in summer, cooling through natural ventilation, and reducing energy consumption in buildings, related structures and adjoining open areas such as storage yards and work depots. Energy conservation can be achieved through the following measures. The Commission may require one or more of the measures to be accommodated as part of any proposal or development design.

- Building siting/orientation to the north, with reduced east and west-facing wall lengths (maximising solar access in winter; minimising solar impact in summer);
- Building siting/orientation and the strategic location of openings to take advantage of prevailing winds (incorporating sufficient protecting against associated rain);
- Location and shading of openings to reduce heating and cooling loads – landscaping and roof overhangs can assist in protecting internal spaces from summer heat while allowing solar access in winter;
- Use of purpose built solar energy devices such as solar panels/collectors for power supply and water heating;
- Use of insulating building materials, particularly as part of roof structures;
- Shading and/or grassing of parking areas; and
- Use of economy style air conditioning, meeting minimum standards in terms of energy efficiency.

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### Planning Policy 1.3 – Landscaping

#### Theme

Landscaping themes in both the public and private domain should draw cues from predominant local vegetation types and flora in and adjacent to the Redevelopment Area. A number of different landscape and vegetation themes is therefore envisaged given the varied nature of the Redevelopment Area and its environs. The use of local vegetation and plant types should contribute to the success of landscape strategies and plantings.

#### Plant selection criteria

In addition to selecting plants based on location criterion, landscaping strategies and Design Guideline requirements (for privately owned land) need to consider plant and tree suitability in terms of scale and function.

Wherever possible, existing trees and mature plants should be retained as part of any development.

The ultimate height of a plant or tree, plus the spread and density of its canopy (in the case of a tree), should be appropriate in the context of the scale of adjoining or adjacent development, and should reflect the function (purpose and nature) of the space within which it sits. In this regard, due consideration should be given to mature canopy dimensions and the extent to which below growth needs to be accommodated.

#### Street plantings

Road reserves will generally be required to make adequate provision for street trees to:

- Provide interest and contribute to the sense of place of the Redevelopment Area and the precincts within;
- Provide shade for pedestrian movement within the Redevelopment Area;
- Assist in breaking the extent of builtform either side of streets, particularly in precincts where limited landscaping is expected to occur in the private domain due to anticipated use of land.

When designing street planting programs, particular consideration needs to be given to:

- Ensuring tree planting takes into account predominant vehicular types using carriageways in particular precincts (heavy haulage vehicles for example will impact differently on tree placement within a road reserve);
- Ensuring trees are appropriately located in terms of property access/egress points and vehicular movement requirements including turning circles;
- Providing for tree planting and lighting to be successfully accommodated together within a road reserve to ensure adequate illumination at night.

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A single species of tree should generally be used in a street to provide for uniformity and integrity of appearance. In some locations though, for the purpose of achieving a special effect or to respond to an adjoining precinct or location, different trees may be used.

#### Landscaping in reserves and open spaces

Landscaping in reserves and open spaces should respect original vegetation types and reinforce landscape character in terms of design and implementation.

#### Water-Saving Landscapes

In all instances, particular emphasis should be placed on developing landscaping that has regard for water conservation (reduced water use). Native species well suited to local climatic conditions, particularly long dry summers, should form the basis of landscape designs. This should assist in reducing the need for extensive reticulation of landscaped areas. Where required however, reticulation should be designed and installed in accordance with water wise principles, to provide easy, cost effective maintenance. These principles and practices will be required to be demonstrated in the design and development of landscaping in the public domain.

### *Planning Policy – Water Management Strategy*

The purpose of the Water Management Strategy and the associated Planning Policy is to provide water management guidelines for the Hope Valley-Wattleup Redevelopment Plan that provides for the long term protection of:

- the groundwater resources in the Hope Valley-Wattleup area;
- the western and eastern chains of the Cockburn wetlands; and
- Cockburn Sound.

The Strategy and the Planning Policy are designed to provide guidance to the future precinct, subdivision and development planning stages to ensure protection of these important resources from significant alterations to water balance and quality.

The stormwater management hierarchy to be applied within the HVWRA is:

1. Retain and restore natural drainage systems.
2. Implement non-structural source controls.
3. Minimise run-off.
4. Use of in-system management measures.



## 10.0 REFERENCES

- APP (2003). Hope Valley – Wattleup Redevelopment Project – Proposed Master Plan Report. For Consent to Advertise. 27 February 2003. Produced by APP Pty Ltd.
- Arup (2002). “Hope Valley – Wattleup Redevelopment Project Sustainability Assessment: Existing Project Area and Preferred Redevelopment Option”. Draft. October 2002.
- Australian Interaction Consultants (2002). *Desktop Study for the Hope Valley – Wattleup Re-development Project*. Prepared for Ove Arup Pty Ltd. December 2001 – July 2002.
- Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) (2003a). “Radiation Protection Series”. ARPANSA.  
<http://www.arpansa.gov.au/codes.htm>
- Australian Radiation Protection and Nuclear Safety Agency (ARPANSA), (2003b). “Radiation and Health Information”. ARPANSA.  
[http://www.arpansa.gov.au/is\\_rad.htm](http://www.arpansa.gov.au/is_rad.htm)
- Bamford, (2001). Fauna of Twin Bartram Swamp Complex, Success. Unpublished Report for Gold Estates of Australia.
- Barclay, T (2003). Personal Communication. 12 September, 2003. Environmental Officer, Kwinana Peel Regional Office of the Department of Environment.
- Cockburn Sound Management Council (2002). *Interim Environmental Management Plan for Cockburn Sound and its Catchment*. Prepared for the Environmental Protection Authority. December 2002.
- Conservation Commission of Western Australia (2001). Beeliar Regional Park Draft Management Plan 2001-2011.
- D.A Lord & Associates (2001). The State of Cockburn Sound: A Pressure-State-Response Report. Prepared for Cockburn Sound Management Council.

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[http://www.wrc.wa.gov.au/public/miscellaneous/cockburn/PSR\\_Report\\_Compiled.pdf](http://www.wrc.wa.gov.au/public/miscellaneous/cockburn/PSR_Report_Compiled.pdf)

Davidson, W.A. (1995). Hydrogeology and Groundwater Resources of the Perth Region – Western Australia. Bulletin 142, Geological Surveys of Western Australia.

Department of Conservation and Environment (1983). The Darling System – System 6, Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority – 1983. Part II: Recommendations for Specific Localities.

Department of Environmental Protection (2000). “Volatile Organic Compounds Monitoring in Perth – Baseline Air Toxics Project”, January 2000.

Department of Environmental Protection (DEP) (2001a). “Air Quality In Perth: 1992 – 1999”. Technical Report 109, May 2001.

Department of Environmental Protection (2001b). Potentially Contaminating Activities, Industries & Landuses. Contaminated Sites Management Series. Department of Environmental Protection, Perth.

Environment Australia (1992). “National Strategy for Ecologically Sustainable Development”. Commonwealth of Australia, Canberra.

Environment Australia (1998). “National Greenhouse Strategy”. Commonwealth of Australia, Canberra.

Environmental Protection Authority (DCE) (1983). Conservation Reserves for Western Australia: The Darling System - System 6. Report 13.

Environmental Protection Authority (1993a). A Guide to Wetland Management in the Perth and Near Perth Swan Coastal Plain Area. An Update to EPA Bulletin 374. Bulletin 686.

Environmental Protection Authority (1993b). “Sustainable Development and the Kwinana Industrial Area - Position Paper”. Bulletin 723, November 1993.

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Environmental Protection Authority (1997a). Guidelines for Environment and Planning. Draft.

Environmental Protection Authority (1997b). Guidance for the Assessment of Environmental Factors - Industrial-Residential Buffer Areas (Separation Distances), Draft Policy (Guidance) No. 3", July 1997.

Environmental Protection Authority (1997c). "Environmental Protection (Noise) Regulations 1997: Summary of Regulations". October 1997.

Environmental Protection Authority (1998a). Guidance for the Assessment of Environmental Factors – Groundwater Environmental Management Areas. No. 48. Draft. February 1998.

Environmental Protection Authority (EPA), (1998b). "Preliminary Draft Guidance for the Assessment of Environmental Factors No. 8 - Environmental Noise". June 1998.

Environmental Protection Authority (1999). "Review of the Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1992 As required under Section 36 of the Environmental Protection Act 1986". February 1999.

Environmental Protection Authority (1999b). "Kwinana International Motorplex". Bulletin No. 949, September 1999.

Environmental Protection Authority (2000a). "Preliminary Draft EPA Guidance for the Assessment of Environmental Factors No. 14 – Road and Rail Transportation Noise (Version 3)". May 2000.

Environmental Protection Authority (2000b). "Guidance for the Assessment of Environmental Factors No. 18 – Prevention of Air Quality Impacts from Land Development Sites". Final. March 2000.

Environmental Protection Authority (2000c). "Guidance for the Assessment of Environmental Factors No. 2 - Risk Assessment and Management: Off-site individual risk from Hazardous Industrial Plant". July 2000.

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Environmental Protection Authority (2000d). “Guidance for the Assessment of Environmental Factors No. 50 – Achieving EPA Risk Criteria for development in proximity to existing and proposed High Pressure Gas Transmission Pipelines”. Draft. May 2000.

Environmental Protection Authority (2002). “The Big Picture...managing the Cockburn Sound environment – an Explanatory Document for Environmental Protection (Cockburn Sound)”. Environmental Protection Authority, Perth.

Environmental Protection Authority (2002a). “Towards Sustainability,” Preliminary Position Statement No. 6. Environmental Protection Authority, Perth.

Environmental Protection Authority (2002b). “Principles of Environmental Protection,” Preliminary Position Statement No. 7. Environmental Protection Authority, Perth.

Environmental Protection Authority (2002c). “Guidance for the Assessment of Environmental Factors – Guidance Statement for Minimising Greenhouse Gas Emissions”. No. 12, October 2002.

Environmental Protection Authority (2002d). Environmental Protection of Native Vegetation in Western Australia. Position Statement No.2, March 2002.

Environmental Protection Authority (2002e). “Terrestrial Biological Surveys as an element of Biodiversity Protection”. Position Statement No.3, March 2002.

Environmental Protection Authority (2003a). “Guidance No. 51: Terrestrial flora and vegetation surveys for environmental impact assessment in Western Australia”. Draft.

Environmental Protection Authority (2003), “Guidance for the Assessment of Environmental Factors - Implementing best practice in proposals submitted to the environmental impact assessment process, No 55, Draft”, March 2003.

Environmental Protection Authority (2003b). “Guidance No. 56: Terrestrial fauna surveys for environmental impact assessment in Western Australia”. Draft.

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ERM (1999) Fremantle-Rockingham Industrial Area Regional Strategy. Final Report  
– Attachment 1.

Gibson, N. Keighery, B. Keighery, G. Burbidge A and Lyons M. (1994). A Floristic Survey of the southern Swan Coastal Plain. Unpublished Report for the Australian Heritage Commission prepared by the Department of Conservation and Land Management and the Conservation Council of Western Australia.

Goble-Garratt, E..M. (2002). Hope Valley – Wattleup Redevelopment Area – Natural History Aspects. Unpublished Report to Arup, Perth, Western Australia.

Government of Western Australia (1998). “Environment Western Australia, 1998”. State of the Environment Report for Western Australia. Department of Environmental Protection, Perth.

Government of Western Australia (2000). *Bush Forever: Keeping the Bush in the City*. Western Australian Planning Commission. Perth.

Government of Western Australia (2001). Wildlife Conservation (Specially Protected Fauna) Notice 2001. Government Gazette, WA, 14 August 2001, pp 4238 -4245.

Government of Western Australia (2002). “Focus on the Future: The Western Australian State Sustainability Strategy”. Consultation Draft. Department of Premier and Cabinet, Perth.

Government of Western Australia (2003). Wildlife Conservation Act 1950 Wildlife Conservation (Specially Protected Fauna) Notice 2003  
[http://www.calm.wa.gov.au/plants\\_animals/pdf\\_files/wildlife\\_cons\\_notice\\_fauna2003.pdf](http://www.calm.wa.gov.au/plants_animals/pdf_files/wildlife_cons_notice_fauna2003.pdf)

Hedde, E.M., Loneragan, O.W. and Havel, J.J. (1980). Vegetation Complexes of the Darling System, Western Australia. In Hedde *et al.* (1980). *Atlas of Natural Resources, Darling System, Western Australia*. Department of Conservation and Environment, Perth.

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Environmental Review	Revision	<b>For Public Comment</b>
	Date	05/12/03

- Herring Storer Acoustics (2002). "Champion Lakes Master Plan Development: Acoustic Assessment for Bowman Bishaw Gorham". Published Report, August 2002.
- Hill A, Semeniuk C, Semeniuk V, and Del Marco, M (1996). Wetlands of the Swan Coastal Plain. Volume 2B. Wetland Mapping, Classification and Evaluation.
- How, R.A. and Dell, J. (2000). Ground vertebrate fauna of Perth's vegetation remnants: impact of 170 years of urbanisation. Pacific Conservation Biology 6(3).
- Lantzke, N. (1997). Phosphorus and Nitrate Loss from Horticulture on the Swan Coastal Plain. Publication 16/97. Agriculture Western Australia.
- National Environment Protection Council (1998). National Environment Protection Measure for Ambient Air Quality, 26 June 1998.
- National Environment Protection Council (1999) "National Environment Protection (Assessment of Site Contamination Measure)", December 1999.
- National Environment Protection Council (2003a). "Variation to the National Environment Protection (Ambient Air Quality) Measure for Particles As PM2.5, June 2003.
- National Environment Protection Council (2003b). "National Environment Protection (Air Toxics) Measure - Draft NEPM for Public Consultation", 23 May 2003.
- Palassis Architects (2002). "Hope Valley-Wattleup Redevelopment Project – European Heritage Study". March 2003. Prepared for Ove Arup Pty Ltd.
- Royal Prince Alfred Hospital (2001). "Effects of Radiation on Humans". Department of PET and Nuclear Medicine, Royal Prince Alfred Hospital, Sydney. <http://www.cs.nsw.gov.au/rpa/pet/RadTraining/EffectsofRadiationonHumans.htm>
- Tingay and Associates (1998). *A Strategic Plan for Perth's Greenways*. Report to the Ministry for Planning, Perth, 1998.



Water and Rivers Commission (2000) “Environmental Water Provisions Policy for Western Australia Statewide Policy No. 5” Water and Rivers Commission, Perth.

Water and Rivers Commission (2001). “Position Statement: Wetlands” Water and Rivers Commission, Perth.

Water and Rivers Commission (2003). Water and Rivers Commission Website – Government of Western Australia - <http://www.wrc.wa.gov.au/home.html>

Water Authority of Western Australia (1993). *Cockburn Groundwater Area Management Plan - WG 159*.

Western Australian Land Authority (2003), “Hope Valley – Wattleup Redevelopment Scheme – Scheme Text”. April 2003.

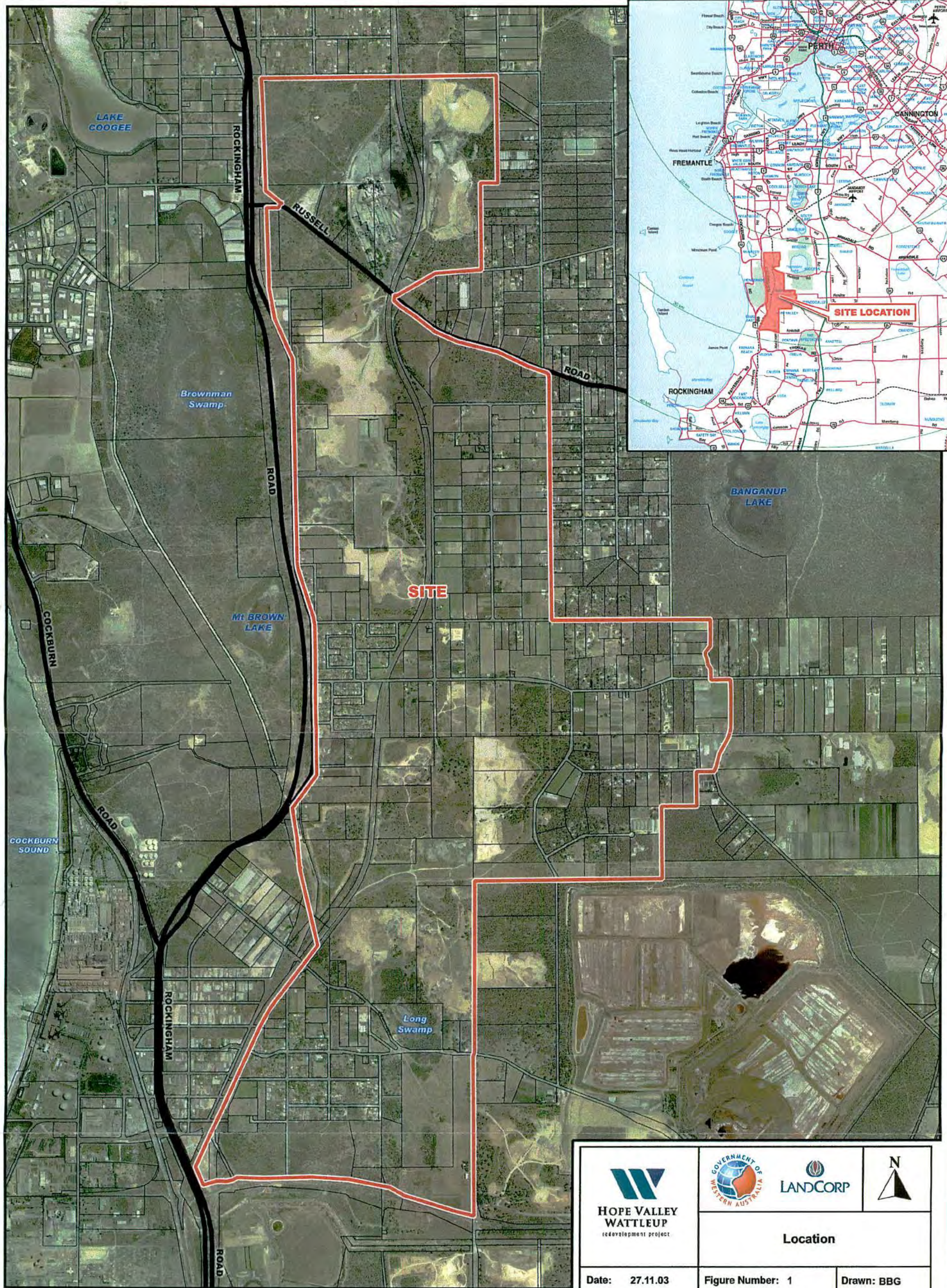
Western Australian Planning Commission (2000). Fremantle-Rockingham Industrial Area Regional Strategy. Report on Submissions and Final Report.





Western Australian Planning Commission (2002). Review of Kwinana Air-Quality Buffer. For Public Comment. Published by the Western Australian Planning Commission.

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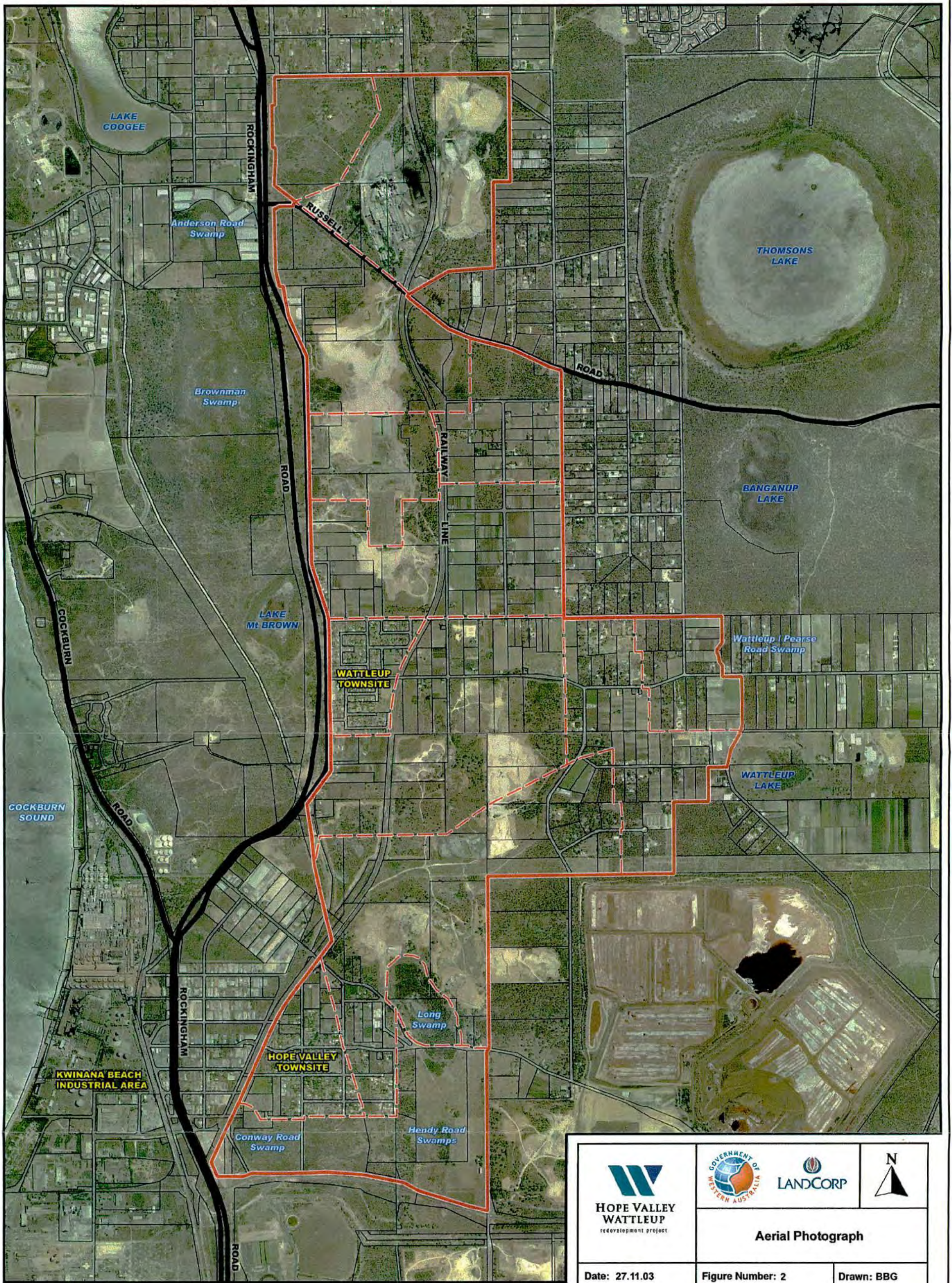
## FIGURES









 <b>HOPE VALLEY WATTLEUP</b> redevelopment project	 <b>GOVERNMENT OF WESTERN AUSTRALIA</b>	 <b>LANDCORP</b>	
	<b>Location</b>		
Date: 27.11.03	Figure Number: 1	Drawn: BBG	
Source:			
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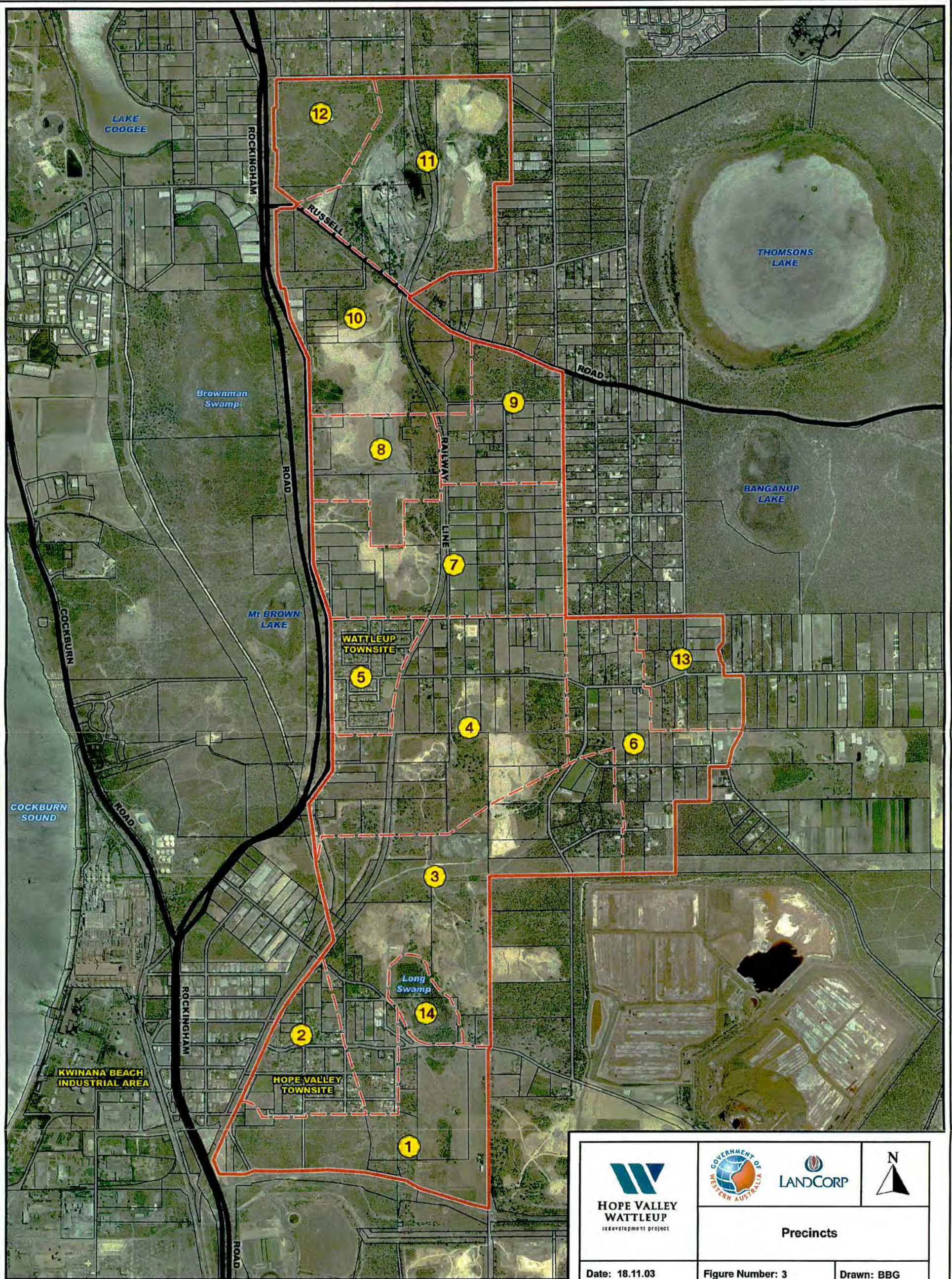


**LEGEND**

- Site Boundary
- - - Precinct Boundary





 <b>HOPE VALLEY WATTLEUP</b> <small>redevelopment project</small>	 <b>GOVERNMENT OF WESTERN AUSTRALIA</b>	 <b>LANDCORP</b>	
	<b>Aerial Photograph</b>		
Date: 27.11.03	Figure Number: 2	Drawn: BBG	
Source:			
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**LEGEND**

- Site Boundary
- - - Precinct Boundary
- 3 Precinct Number





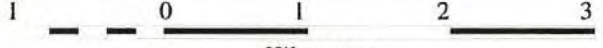
 <b>HOPE VALLEY WATTLEUP</b> <small>redemption project</small>	 	
<b>Precincts</b>		
<b>Date:</b> 18.11.03	<b>Figure Number:</b> 3	<b>Drawn:</b> BBG
<b>Source:</b>		
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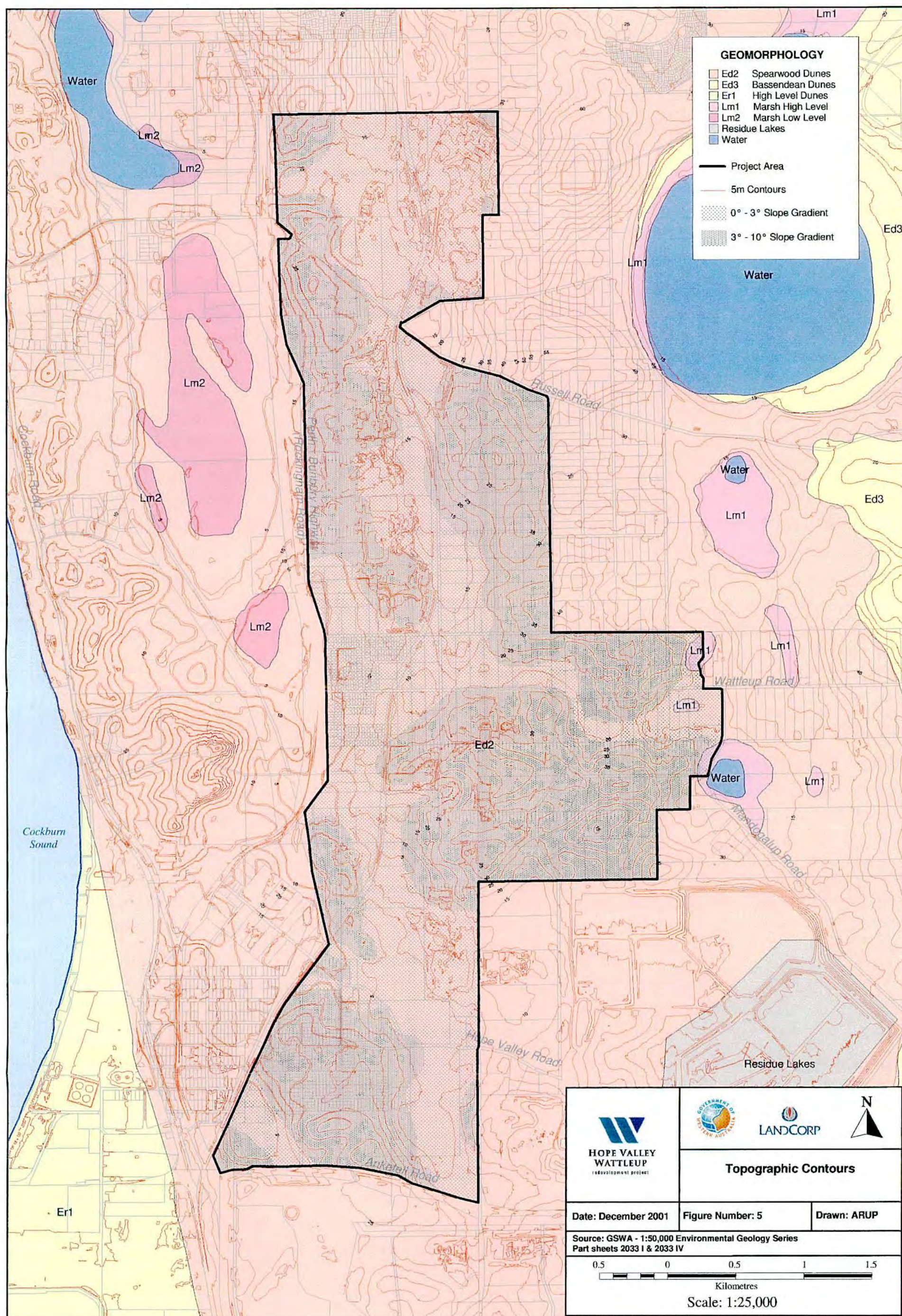


#### LEGEND

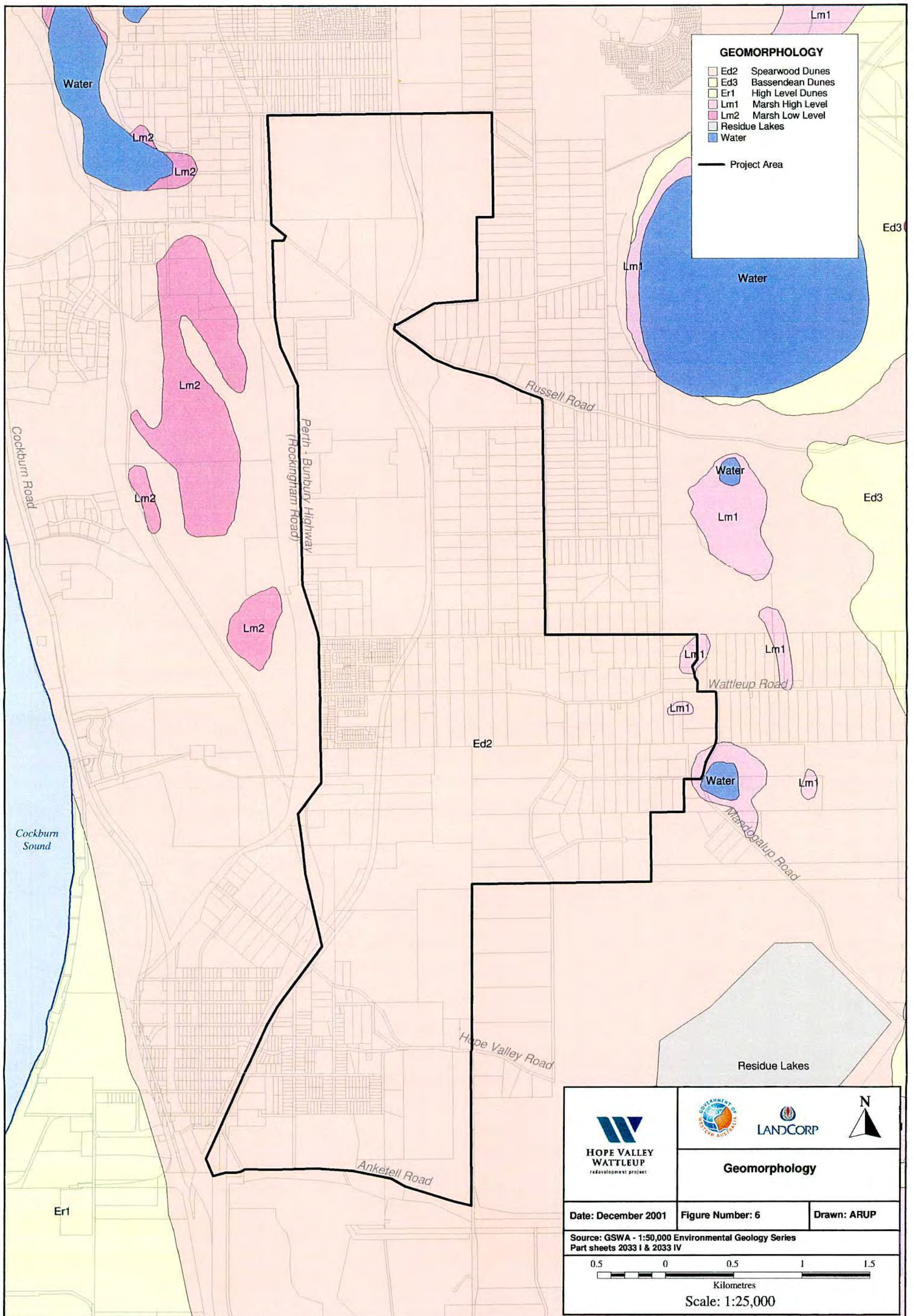
- Site Boundary
- - - Precinct Boundary
- Primary Road
- South-West Metropolitan Rail
- - - Fremantle-Rockingham Controlled Access Highway
- - - Rowley Road Extension
- - - Fremantle to Rockingham Bus Transitway





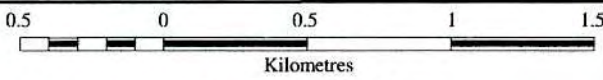
 <p><b>HOPE VALLEY WATTLEUP</b> redevelopment project</p>	 	
<p align="center"><b>Existing and Proposed Transport Network</b></p>		
<p>Date: 27.11.03</p>	<p>Figure Number: 4</p>	<p>Drawn: BBG</p>
<p>Source:</p>		
<p align="center">   Kilometres Scale: 1:50,000 </p>		



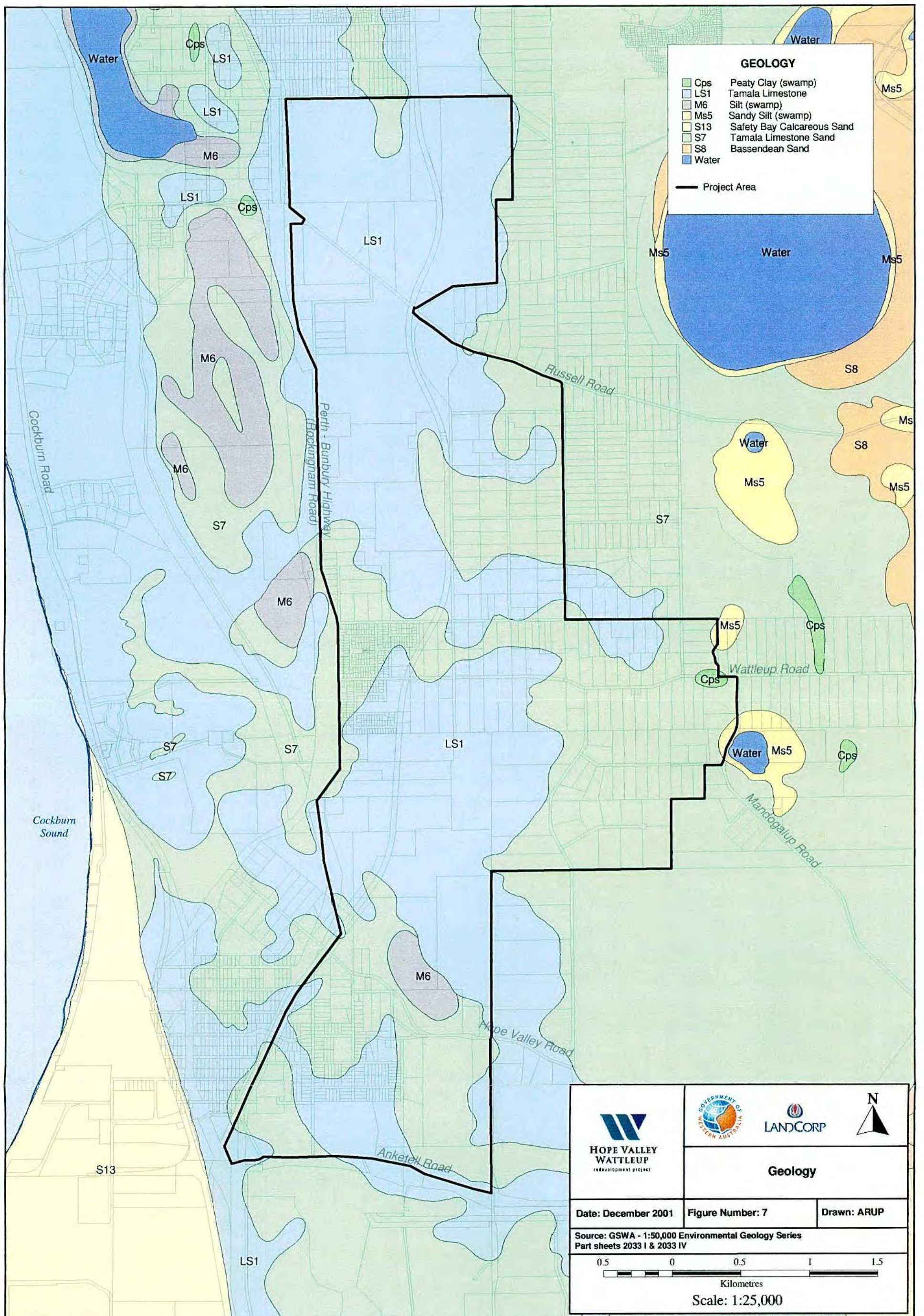






 <b>HOPE VALLEY WATTLEUP</b> redevelopment project	  	
	<b>Geomorphology</b>	
Date: December 2001	Figure Number: 6	Drawn: ARUP
Source: GSWA - 1:50,000 Environmental Geology Series Part sheets 2033 I & 2033 IV		
 Scale: 1:25,000		







**Legend**

Project Area

ALCOA Land (residue disposal)

Extraction Area

Key Extraction Area

Priority Extraction Area

Cement Works

Landfill

Basic Raw Materials (1991 Policy) Resource Area

Tailing Pipeline

Shell Slurry Pipeline

2002

Projected Resource Depletion

2

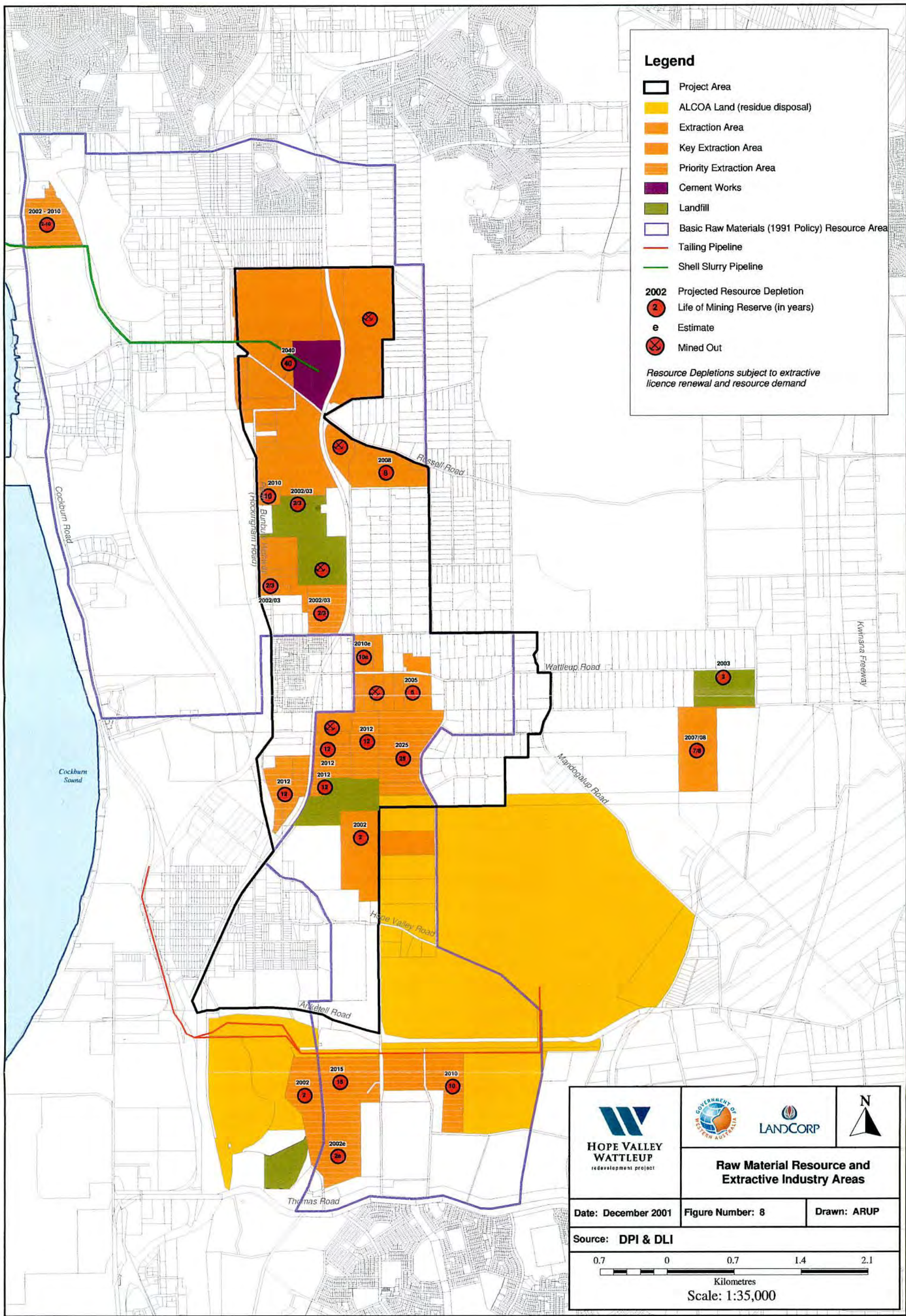
Life of Mining Reserve (in years)

e

Estimate

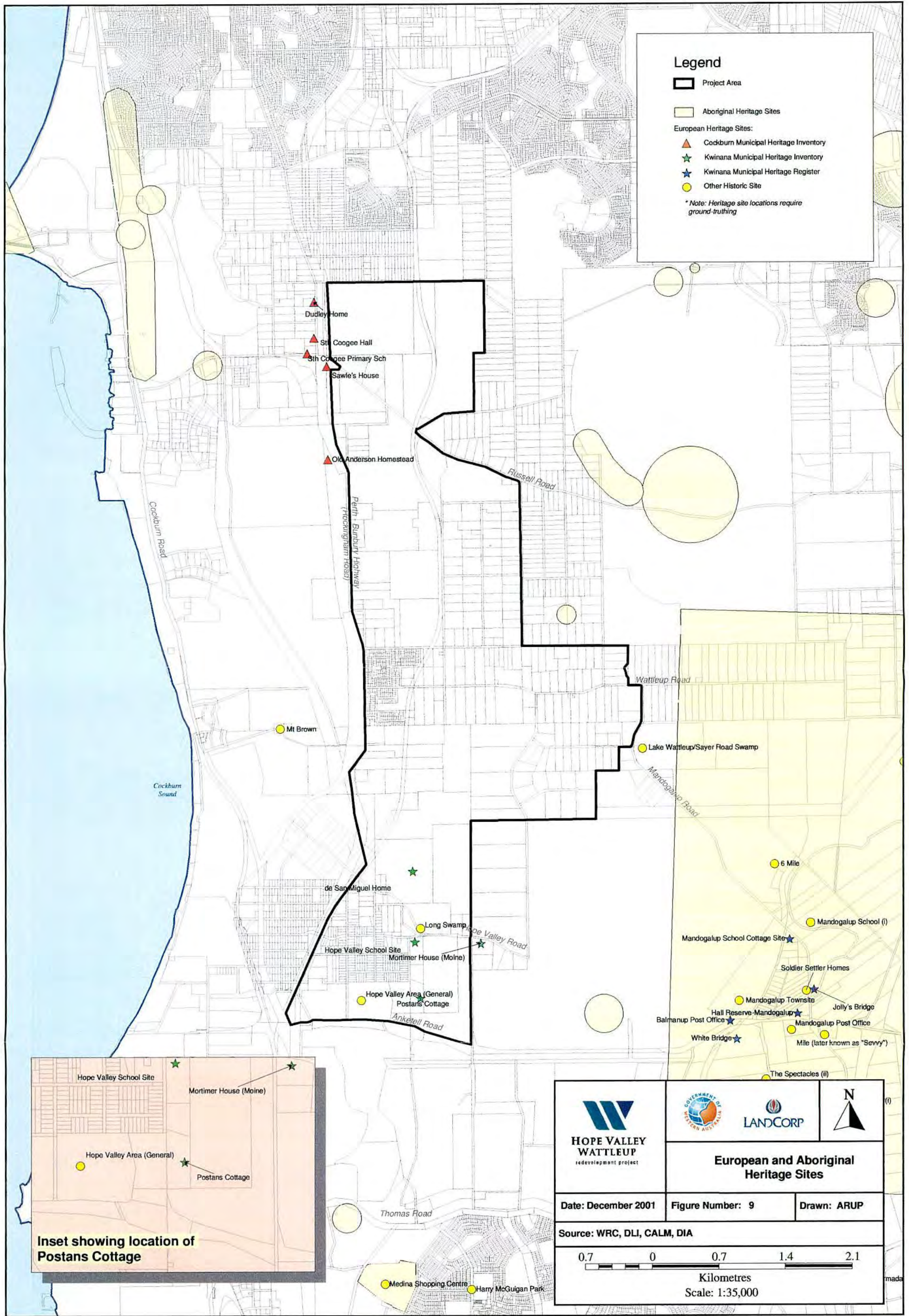
Mined Out

Resource Depletions subject to extractive licence renewal and resource demand

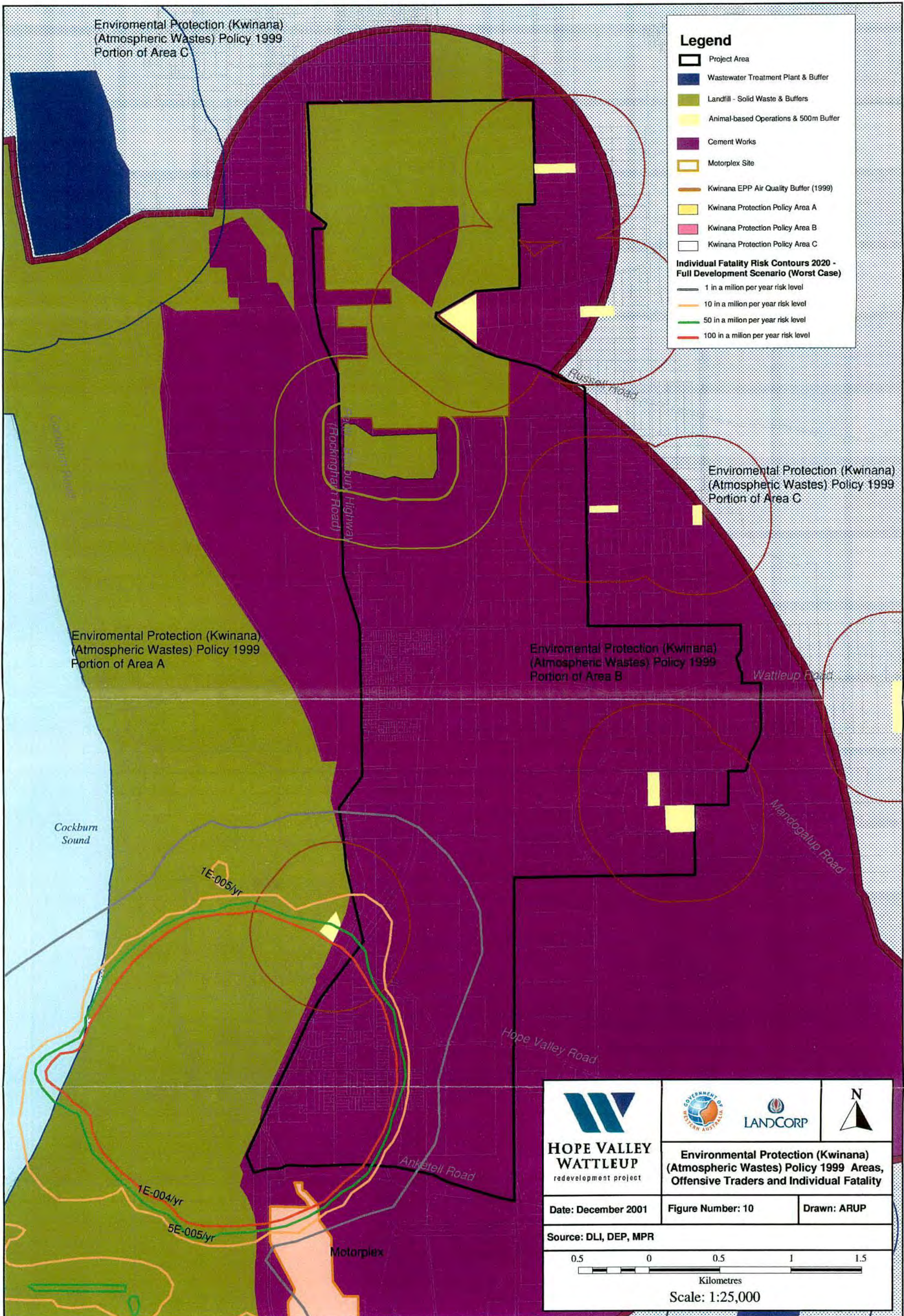


 <b>HOPE VALLEY WATTLEUP</b> redevelopment project	 <b>GOVERNMENT OF WESTERN AUSTRALIA</b>	 <b>LANDCORP</b>	
	<b>Raw Material Resource and Extractive Industry Areas</b>		
Date: December 2001	Figure Number: 8	Drawn: ARUP	
Source: DPI & DLI			
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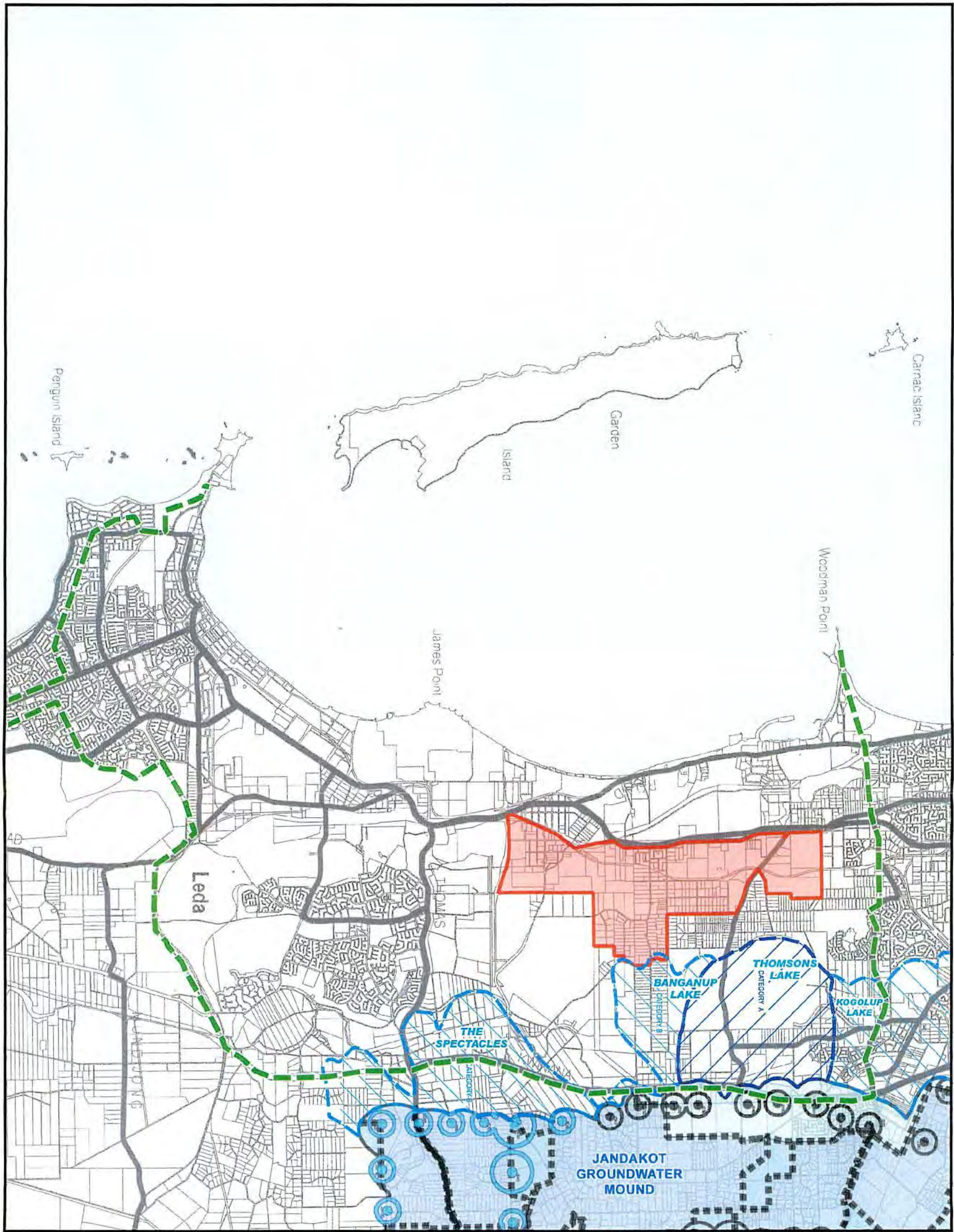












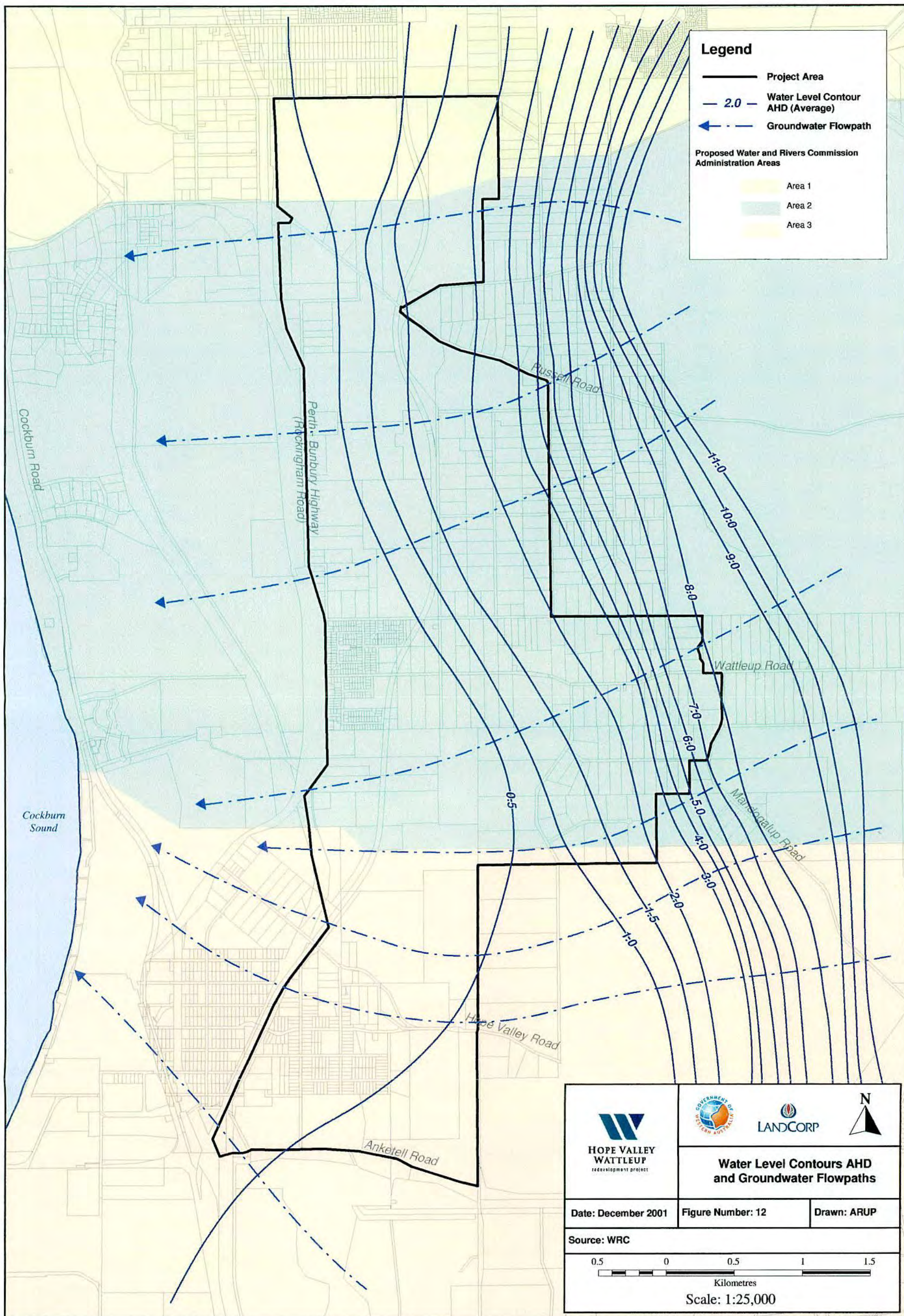




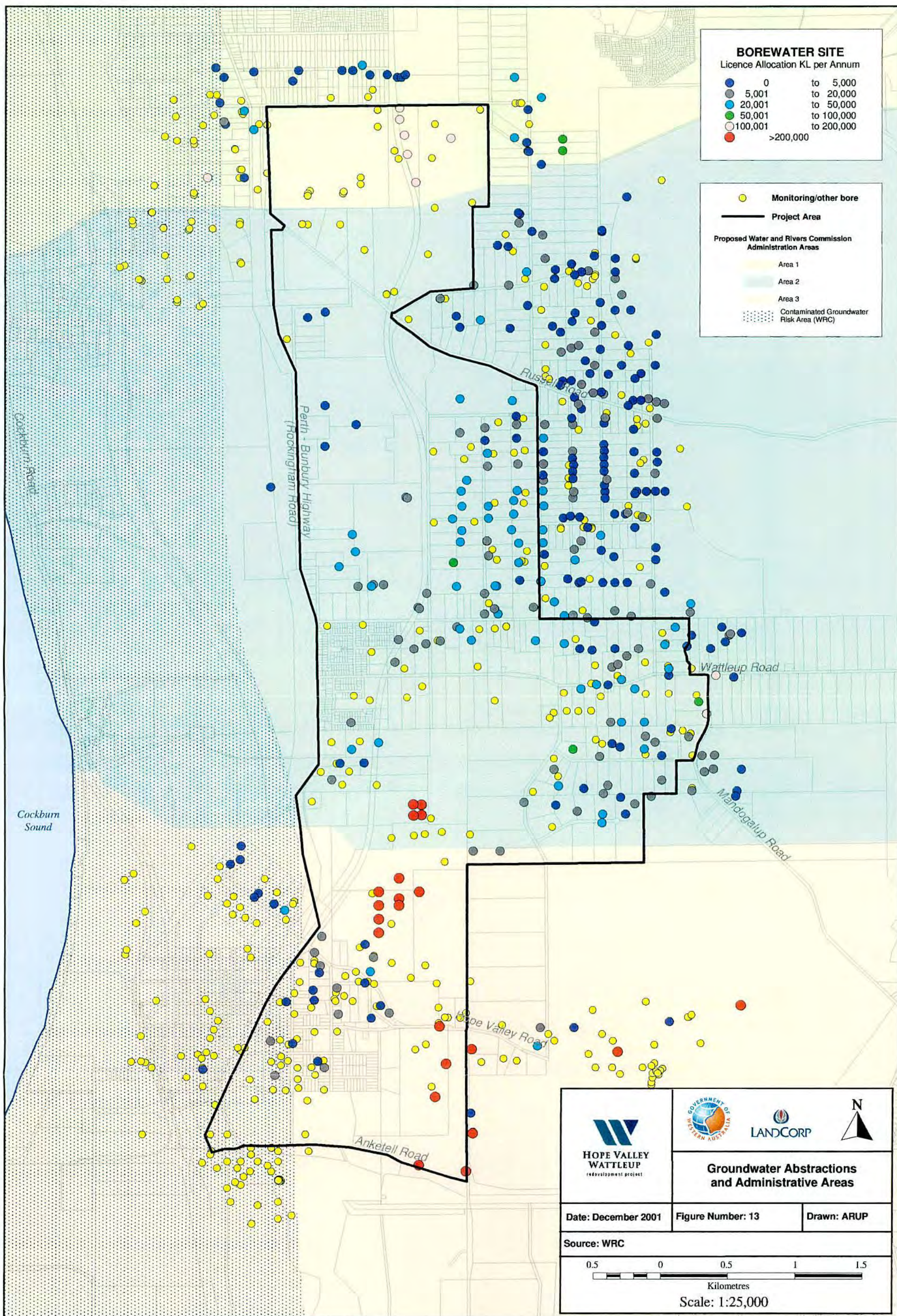
LEGEND	
	EXISTING PUBLIC WATER SUPPLY WELL (UNCONFINED)
	PROPOSED PUBLIC WATER SUPPLY WELL (UNCONFINED)
	WELL HEAD PROTECTION ZONE
	P1 - 500m PROTECTION ZONE
	P2, P3 - 300m PROTECTION ZONE
	PRIORITY 1 SOURCE PROTECTION AREA
	PRIORITY 2 SOURCE PROTECTION AREA
	PRIORITY 3 SOURCE PROTECTION AREA
	PRIORITY SOURCE PROTECTION AREA BOUNDARY
	PROCLAIMED AREA (SEE AMG COORDINATE ANNEXURE 'A')
	CATEGORY 'A' GROUNDWATER ENVIRONMENTAL MANAGEMENT AREA
	CATEGORY 'B' GROUNDWATER ENVIRONMENTAL MANAGEMENT AREA
	SITE BOUNDARY
	COCKBURN SOUND EPP POLICY AREA

 <b>HOPE VALLEY WATTLEUP</b> redevelopment project	 GOVERNMENT OF WESTERN AUSTRALIA	 LANDCORP	 N
Cockburn Sound EPP Policy Area Catchment and Wetland Catchments Associated with the Jandakot Groundwater Mound			
Date: 27.11.03	Figure Number: 11	Drawn: BBG	
Source:			
<div>20246</div> <div>Kilometres</div> <div>Scale: 1:100,000</div>			

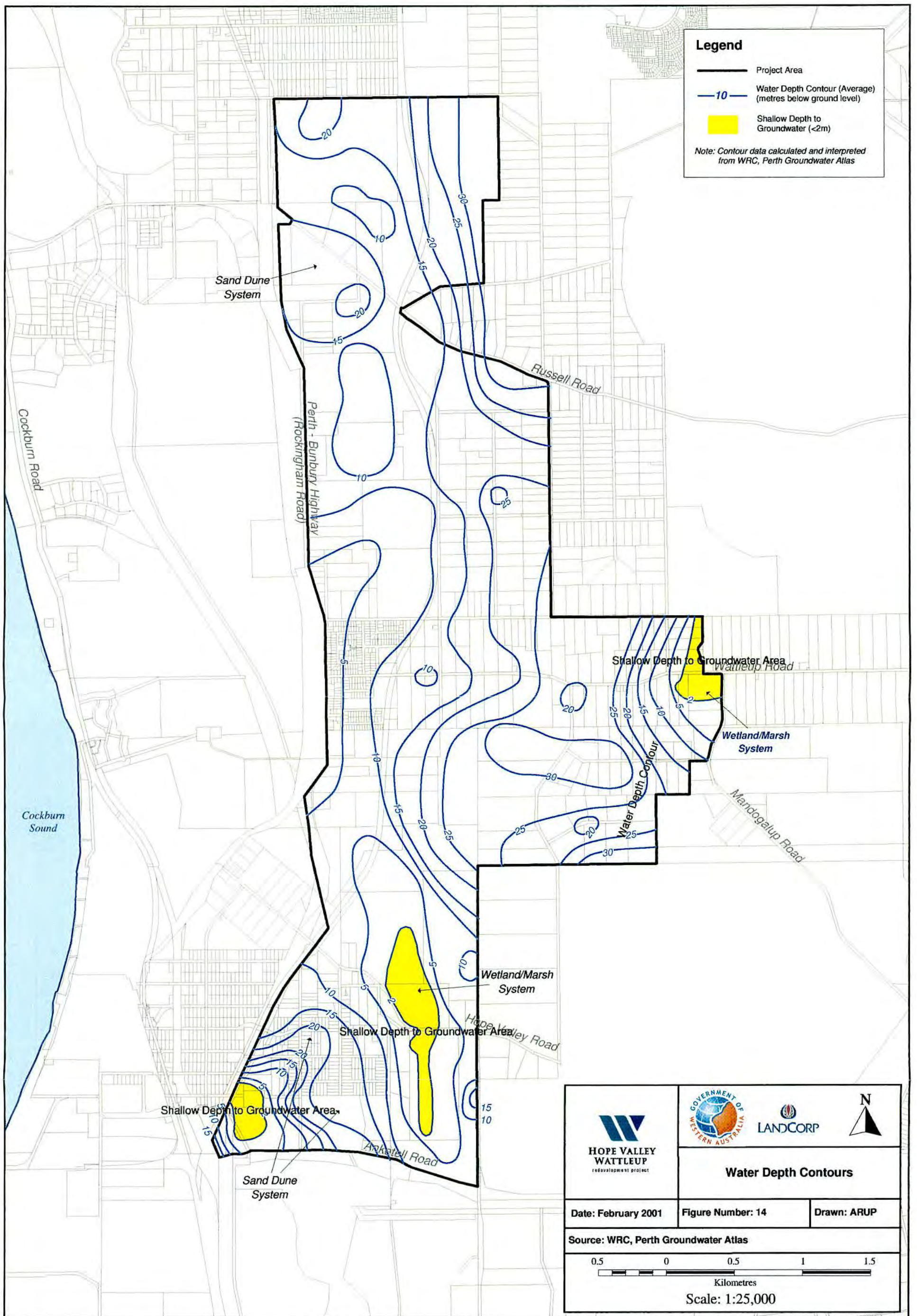




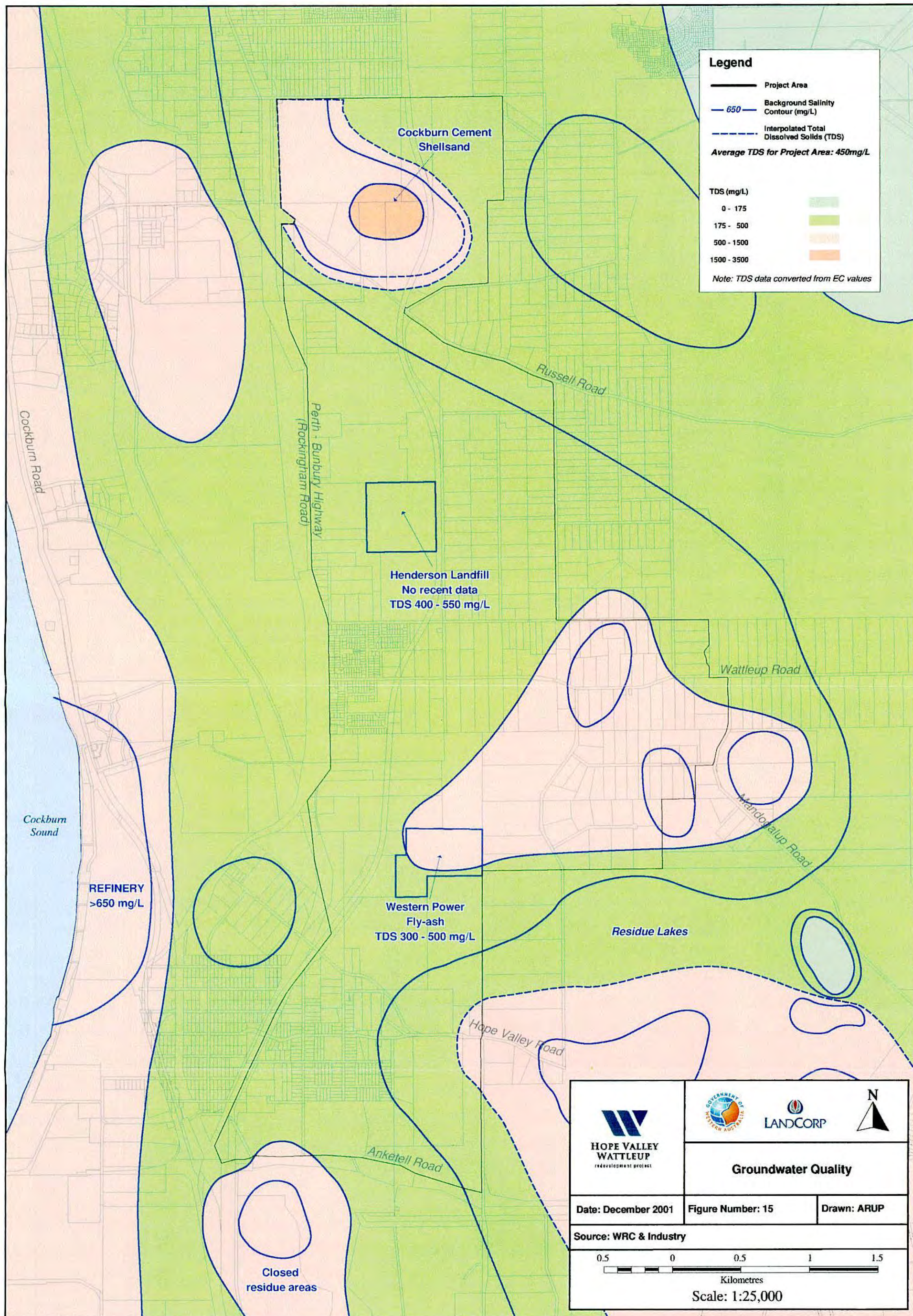




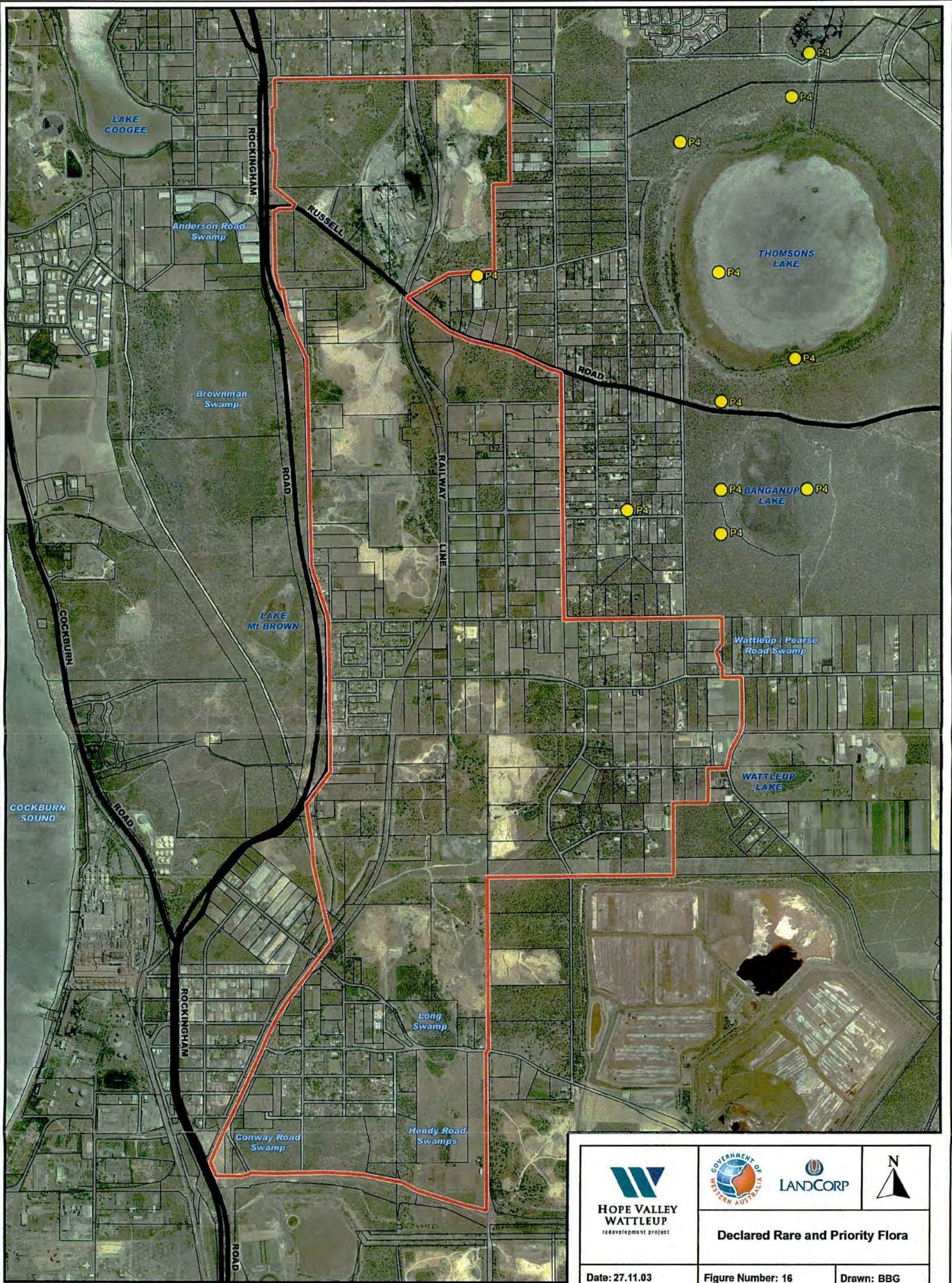










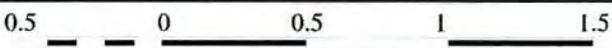




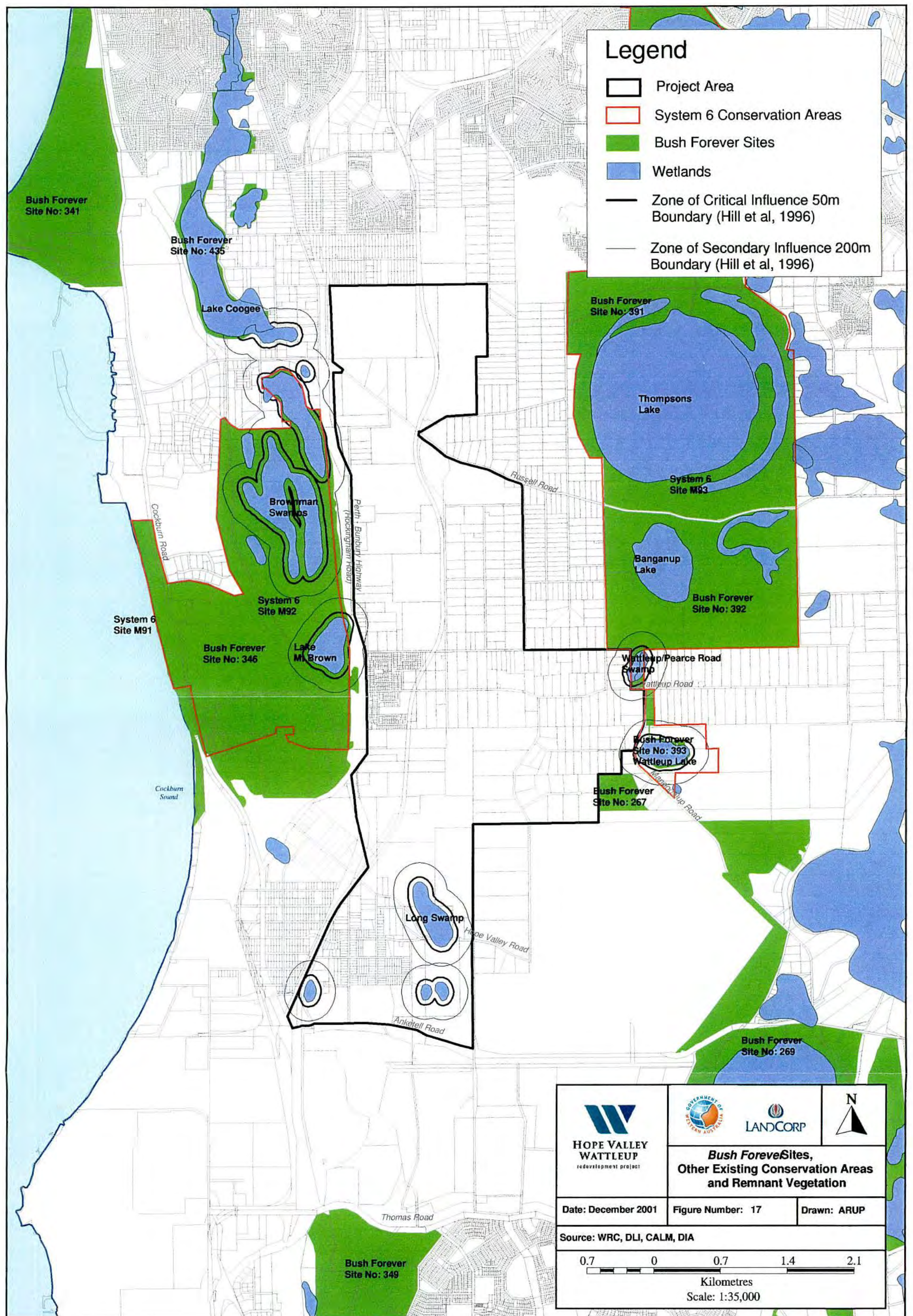


**LEGEND**

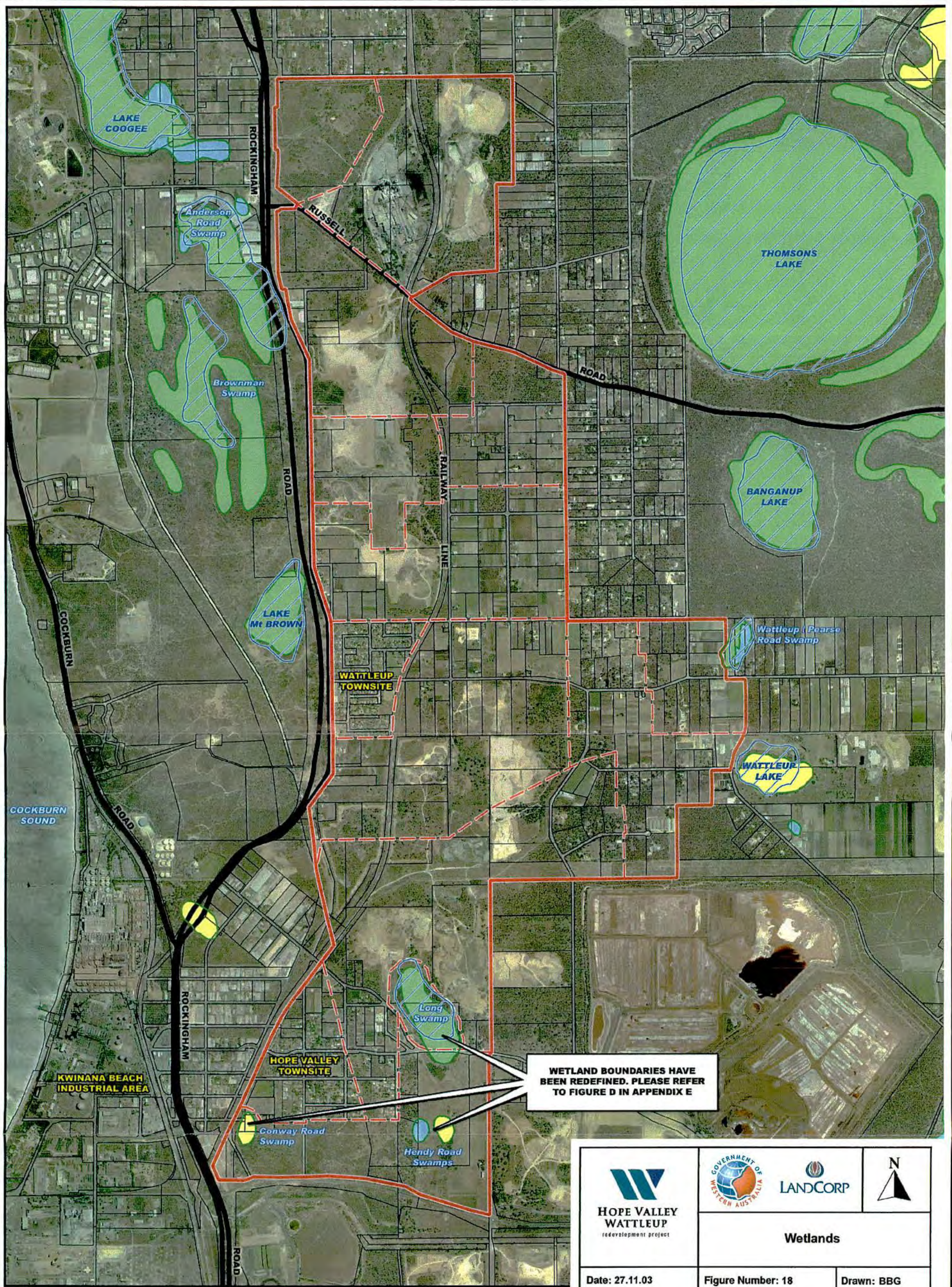
- Site Boundary
- P4 Priority 4 Species

 <b>HOPE VALLEY WATTLEUP</b> <small>redevelopment project</small>		 	
<b>Declared Rare and Priority Flora</b>			
<b>Date:</b> 27.11.03	<b>Figure Number:</b> 16	<b>Drawn:</b> BBG	
<b>Source:</b> Department of Conservation and Land Management Data, August 2003.			
<div style="text-align: center;">  <p>Kilometres</p> <p>Scale: 1:25,000</p> </div>			









#### LEGEND

- Site Boundary
- Precinct Boundary
- Wetlands identified in the Environmental Protection (Svan Coastal Plain Lakes) Policy Approval Order 1992.

#### WETLAND CATEGORY

- Conservation
- Resource Enhancement
- Multiple Use

WETLAND BOUNDARIES HAVE BEEN REDEFINED. PLEASE REFER TO FIGURE D IN APPENDIX E



HOPE VALLEY  
WATTLEUP  
redevelopment project



#### Wetlands

Date: 27.11.03

Figure Number: 18

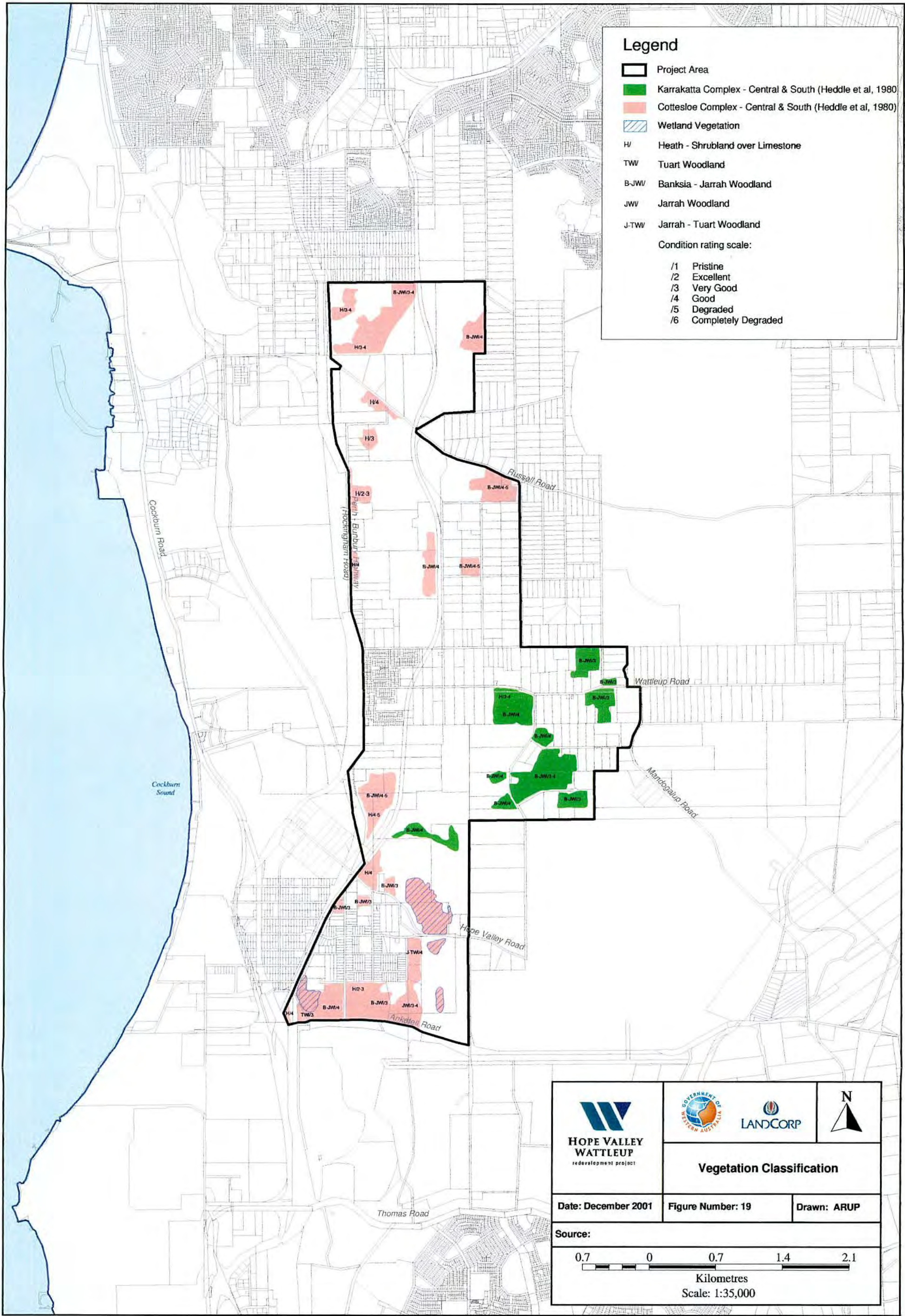
Drawn: BBG





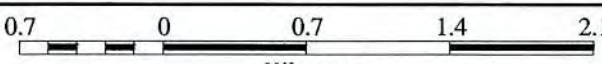
Source: Water and Rivers Commission, 2001. Department of Land Information

0.5 0 0.5 1 1.5

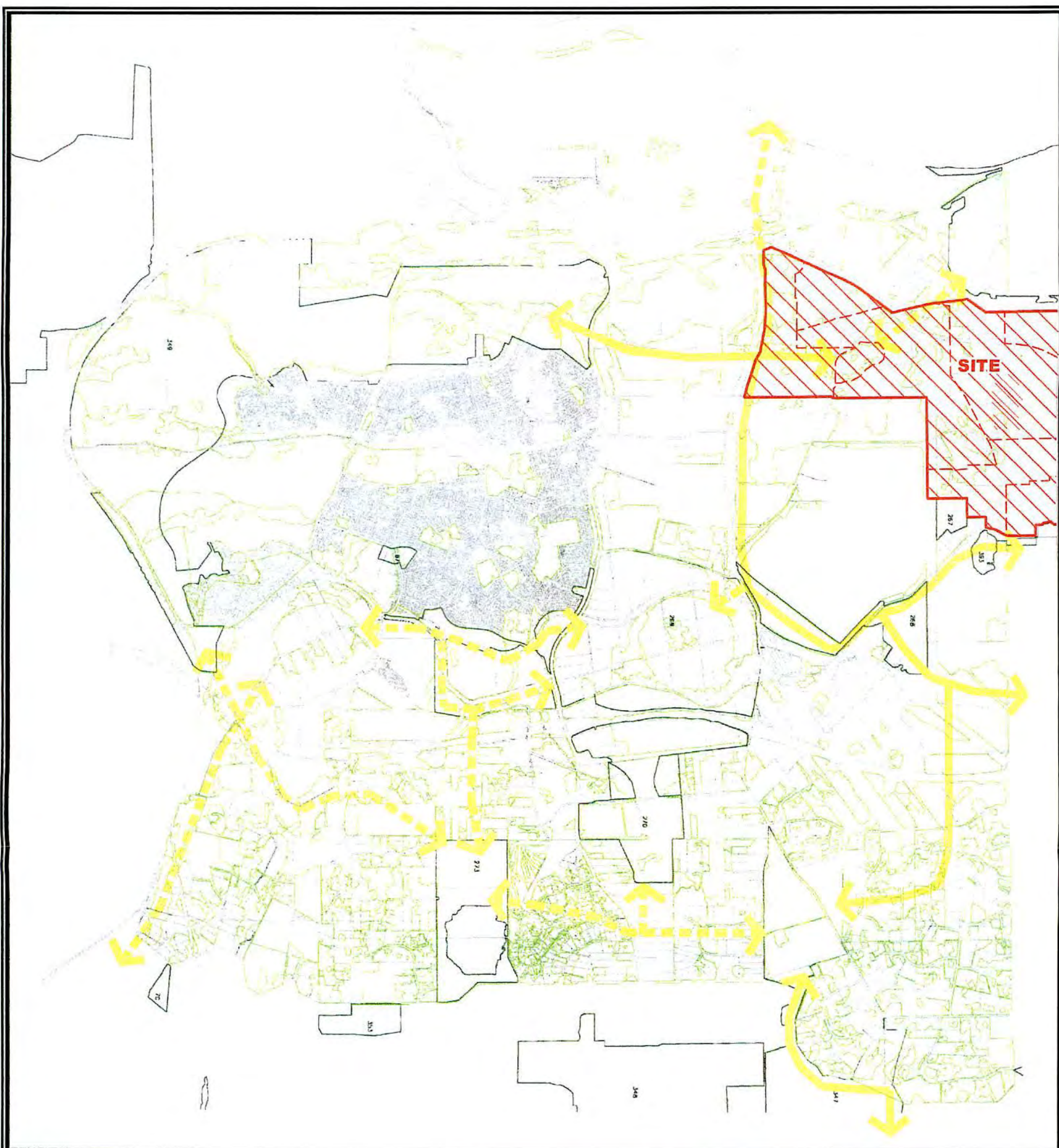
Kilometres  
Scale: 1:25,000








 <b>HOPE VALLEY WATTLEUP</b> redevelopment project	 	
	<b>Vegetation Classification</b>	
Date: December 2001	Figure Number: 19	Drawn: ARUP
Source:		
 Kilometres Scale: 1:35,000		





#### LEGEND

-  REMNANT VEGETATION AS AT APRIL 2000
-  AREAS IDENTIFIED FOR PROTECTION UNDER "BUSH FOREVER" REPORT
-  ECOLOGICAL LINKAGES



**HOPE VALLEY  
WATTLEUP**  
redevelopment project



#### Town of Kwinana Local Greenbelts

Date: 18.11.03

Figure Number: 20

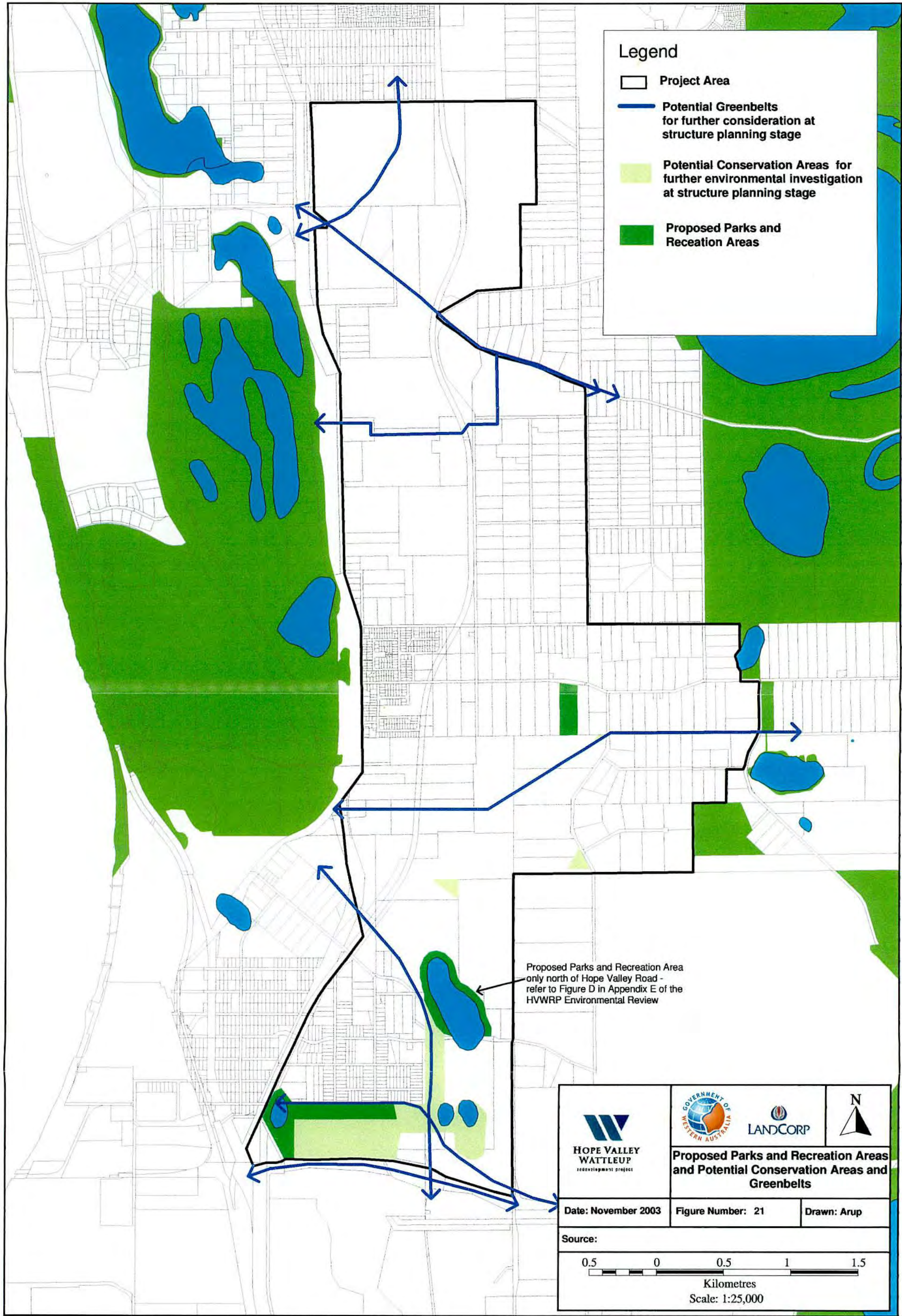
Drawn: BBG

Source: Ecoscape

1.5 0 1.5 3 4.5

Kilometres  
Scale: 1:75,000



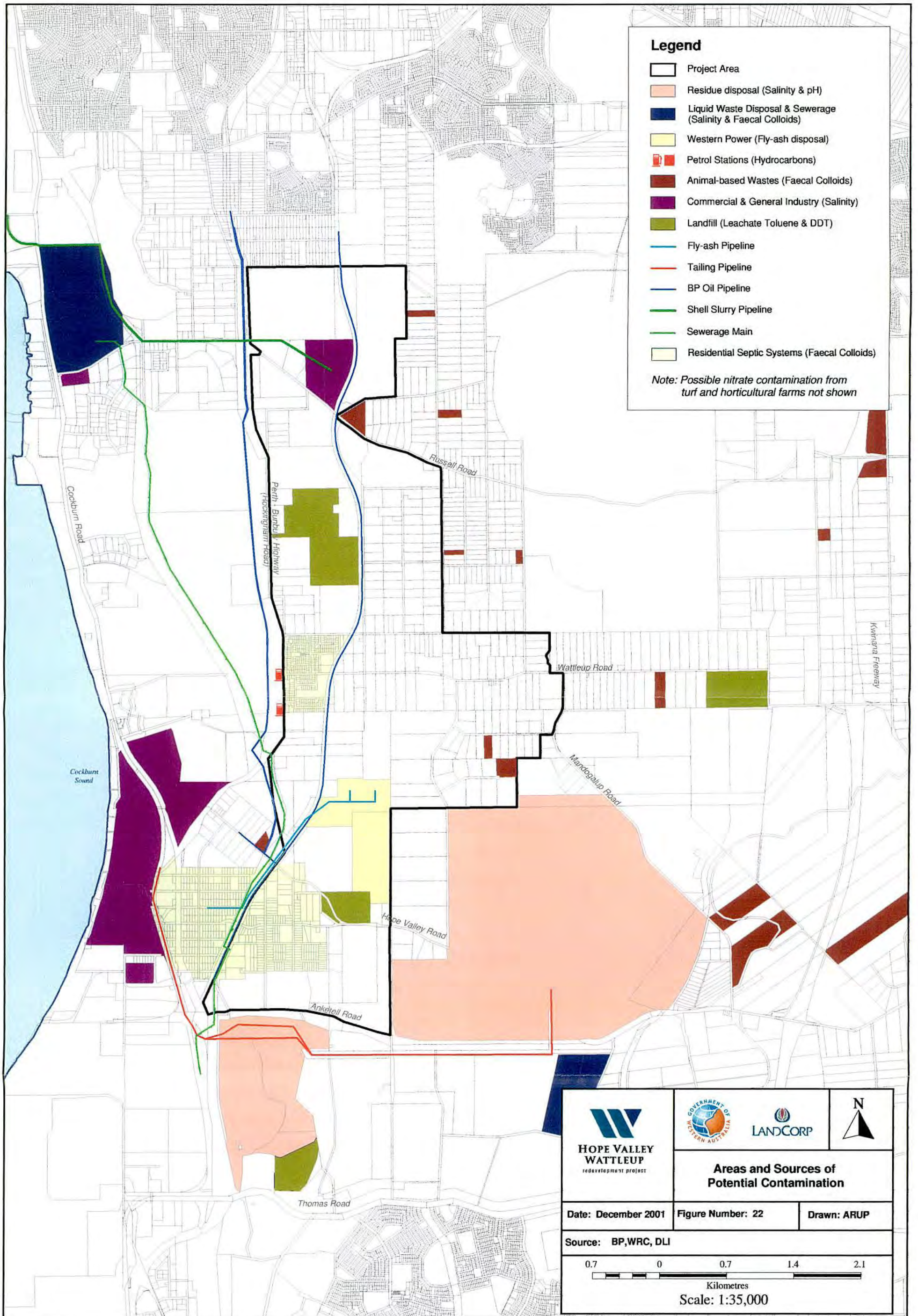




# Legend

- Project Area
- Residue disposal (Salinity & pH)
- Liquid Waste Disposal & Sewerage (Salinity & Faecal Colloids)
- Western Power (Fly-ash disposal)
- Petrol Stations (Hydrocarbons)
- Animal-based Wastes (Faecal Colloids)
- Commercial & General Industry (Salinity)
- Landfill (Leachate Toluene & DDT)
- Fly-ash Pipeline
- Tailing Pipeline
- BP Oil Pipeline
- Shell Slurry Pipeline
- Sewerage Main
- Residential Septic Systems (Faecal Colloids)

*Note: Possible nitrate contamination from turf and horticultural farms not shown*



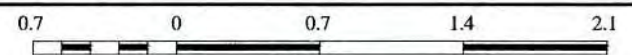
## Areas and Sources of Potential Contamination

Date: December 2001

Figure Number: 22

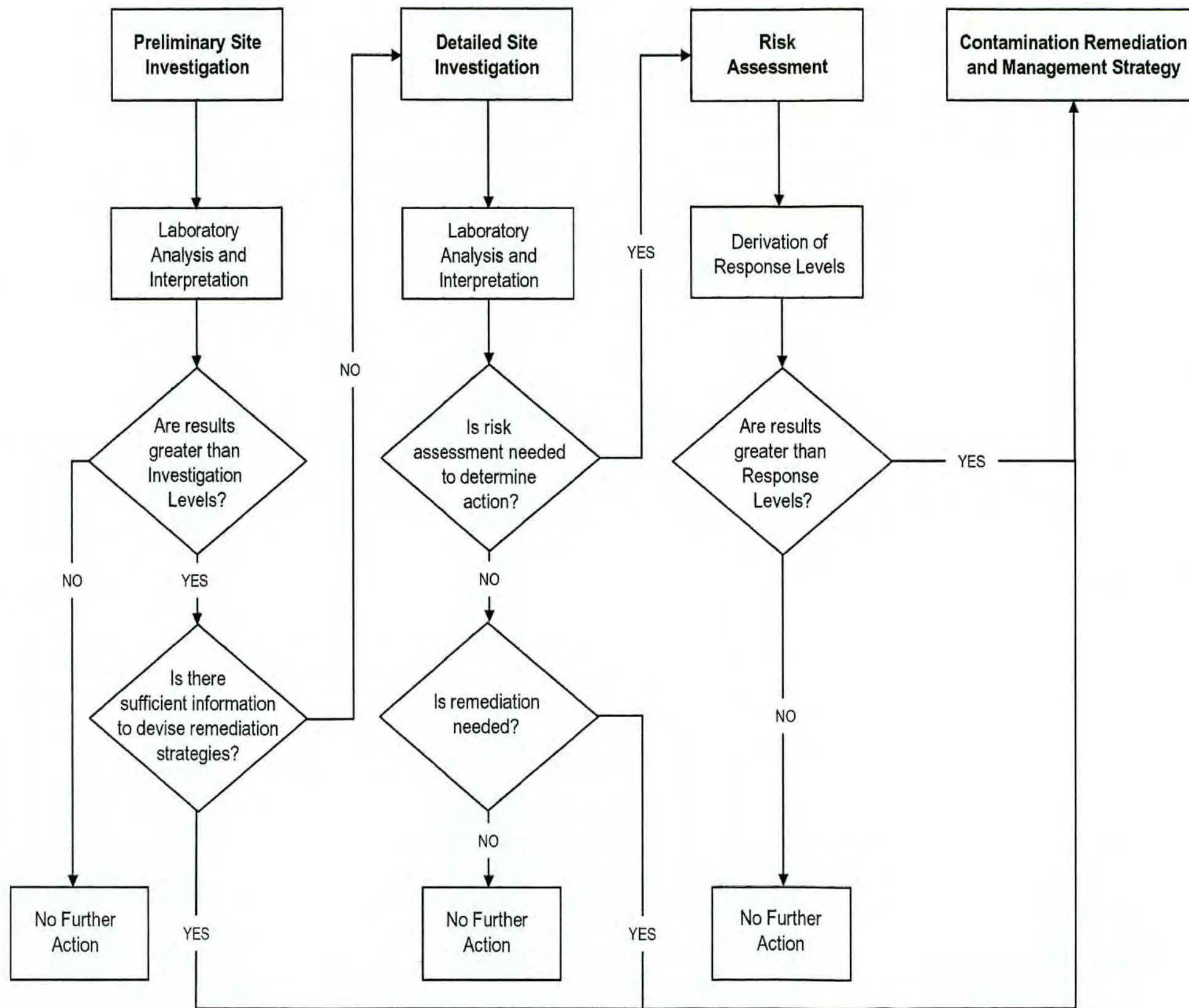
Drawn: ARUP

Source: BP, WRC, DLI



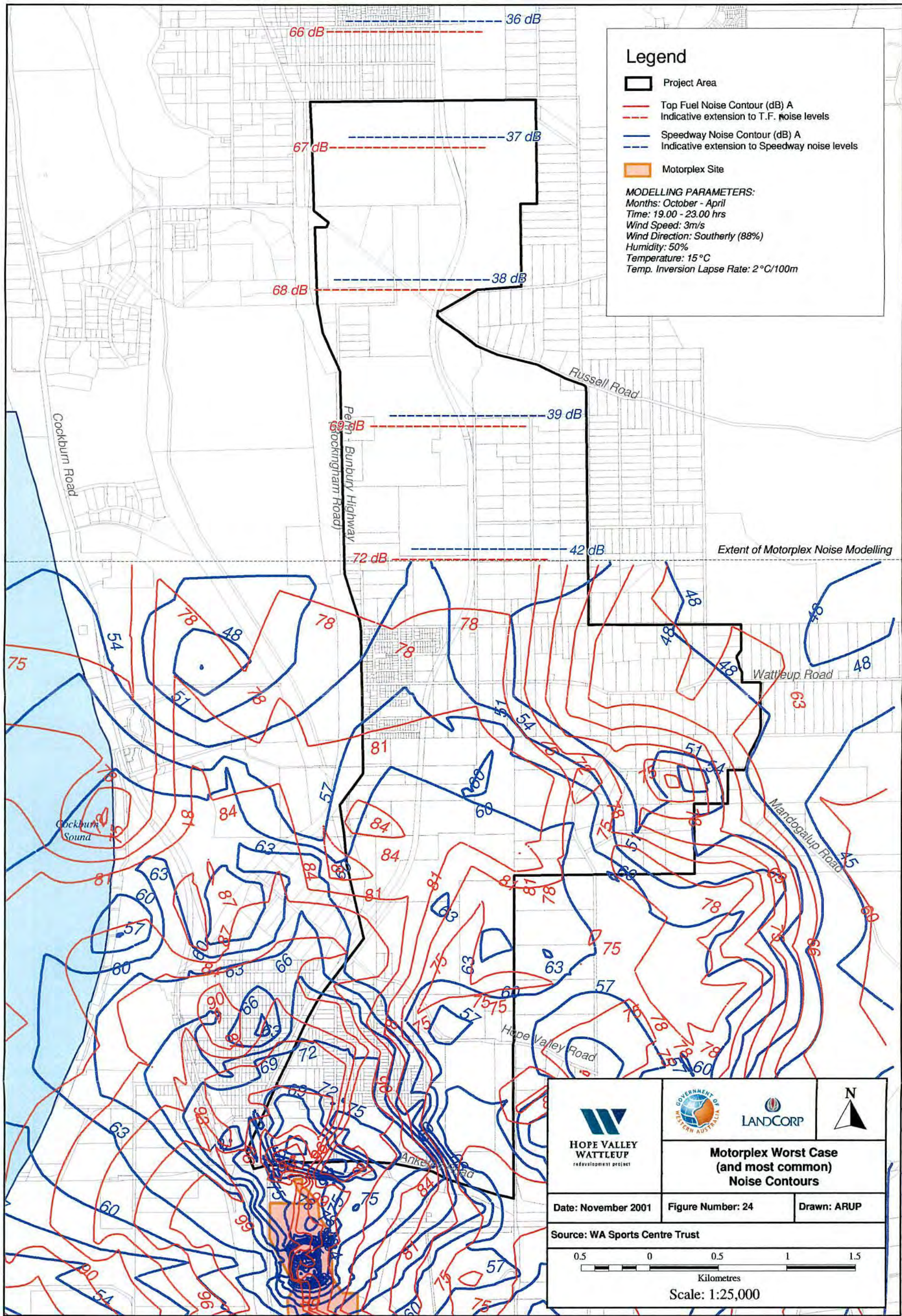
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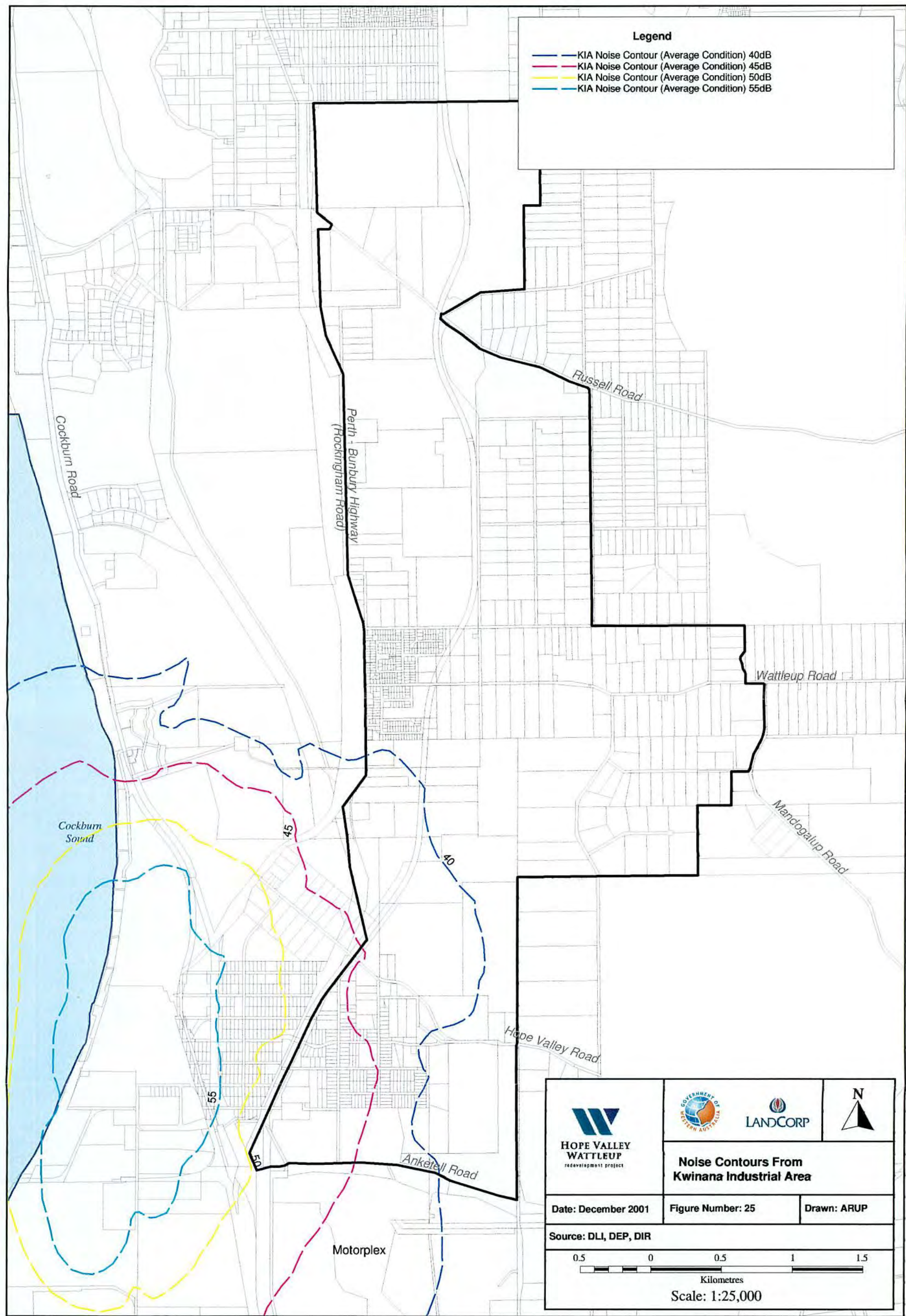






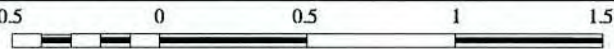
	 		<b>Site Contamination Assessment Process (NEPC, 1999)</b>		Drawn: BBG
		<b>Date: 18.11.03</b>	<b>Figure Number: 23</b>	<b>Source:</b>	



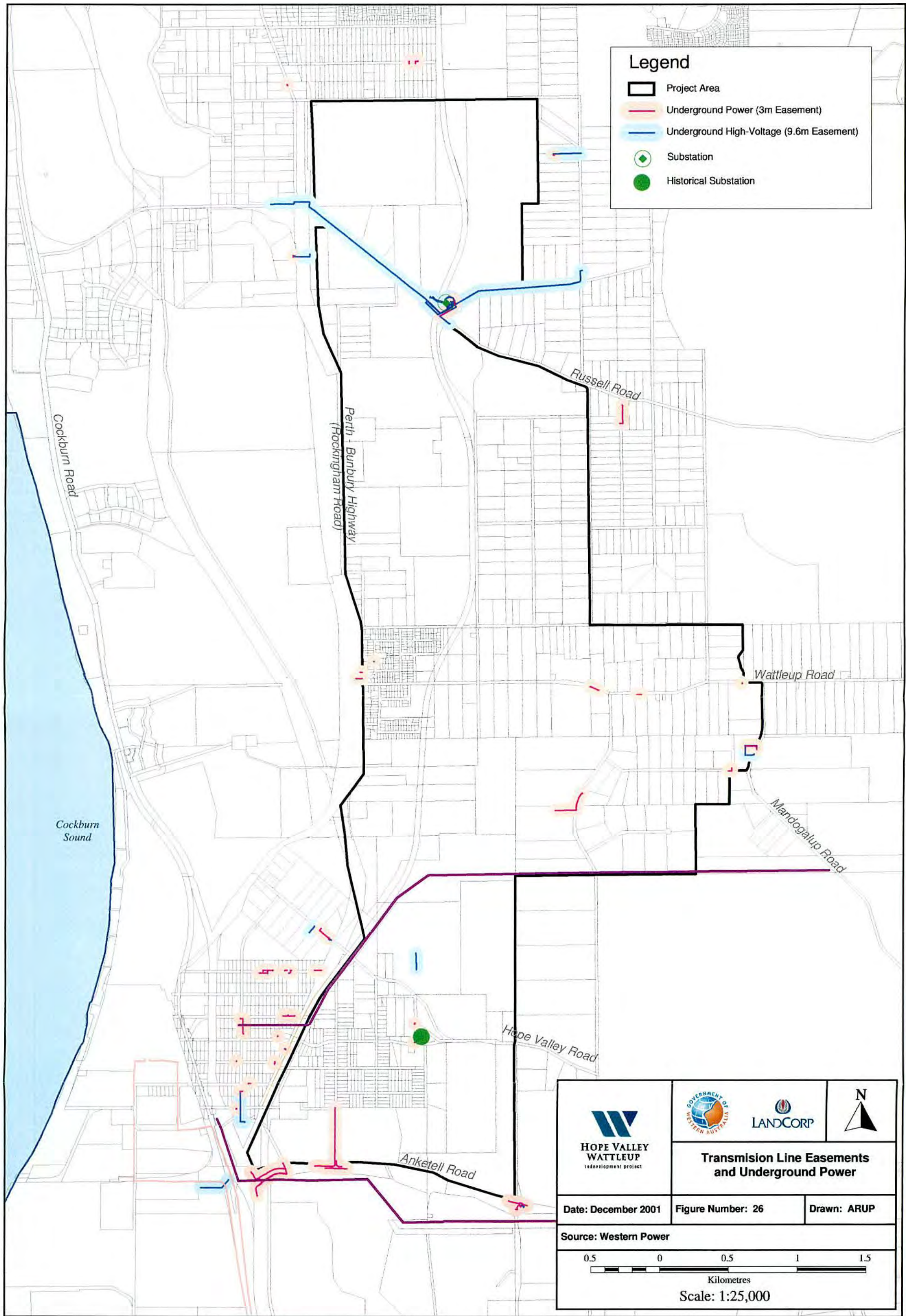




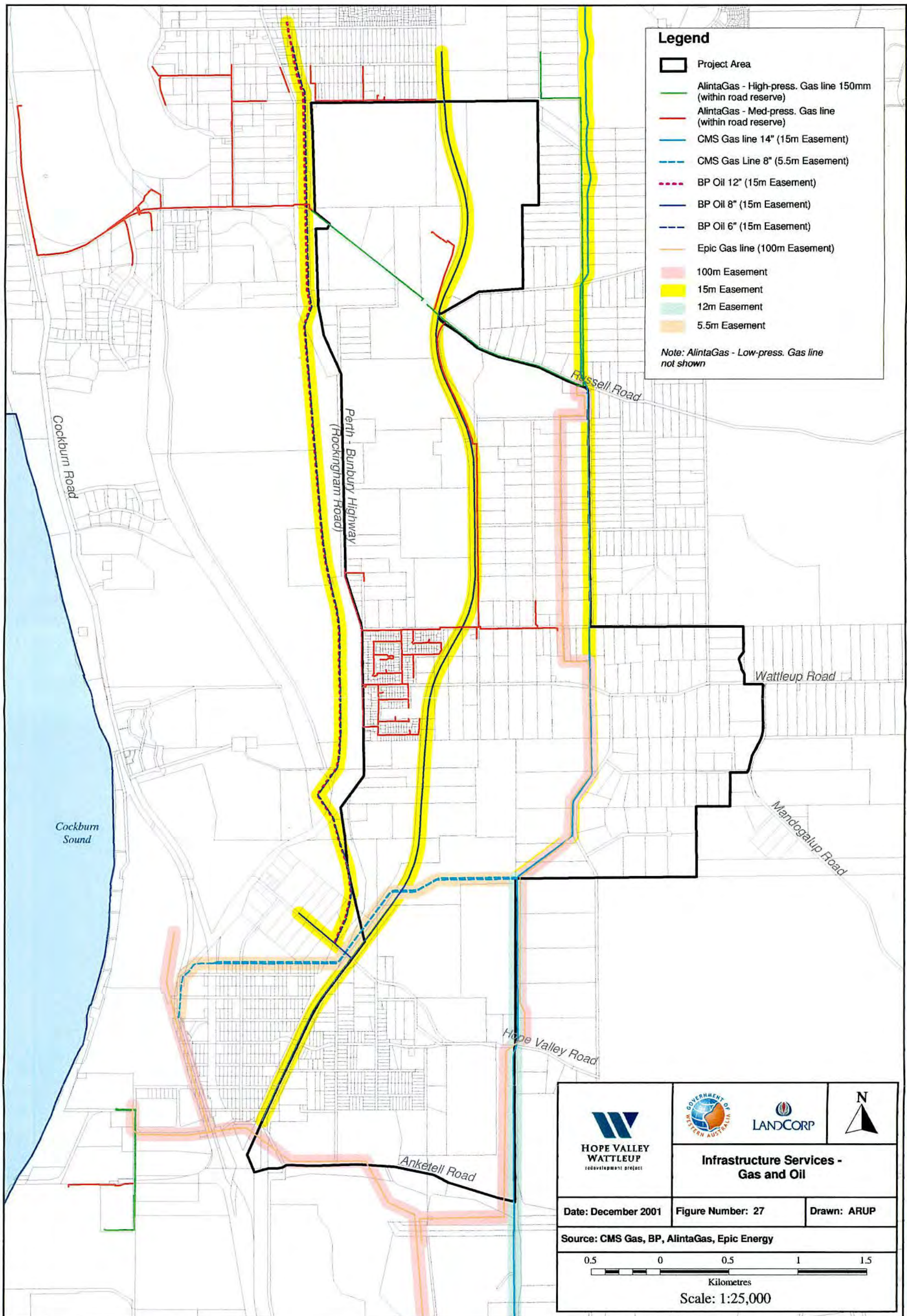


 <b>HOPE VALLEY WATTLEUP</b> redevelopment project	 <b>GOVERNMENT OF WESTERN AUSTRALIA</b>	 <b>LANDCORP</b>	 <b>N</b>
	<b>Noise Contours From Kwinana Industrial Area</b>		
<b>Date: December 2001</b>	<b>Figure Number: 25</b>	<b>Drawn: ARUP</b>	
<b>Source: DLI, DEP, DIR</b>			
 Kilometres Scale: 1:25,000			

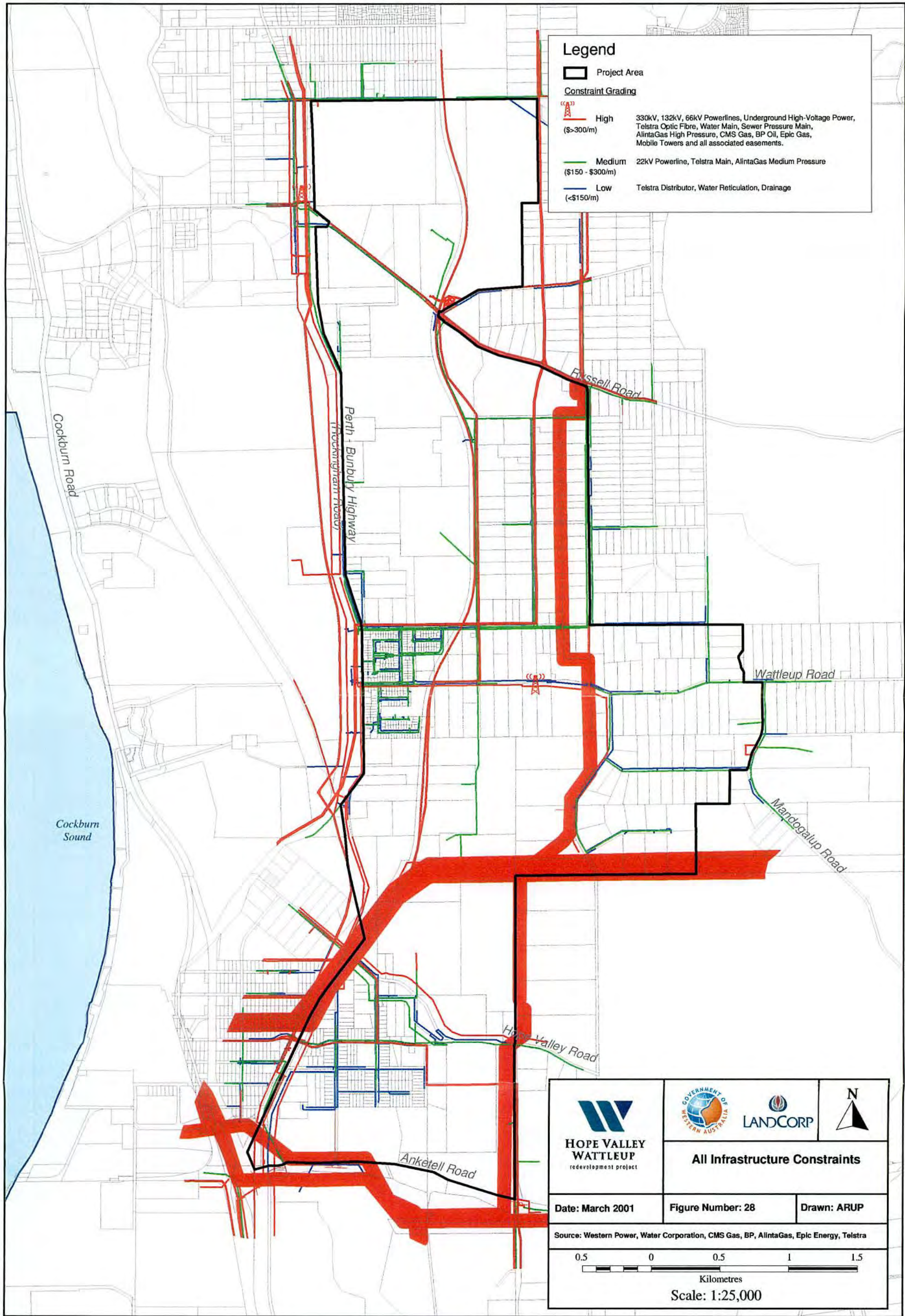




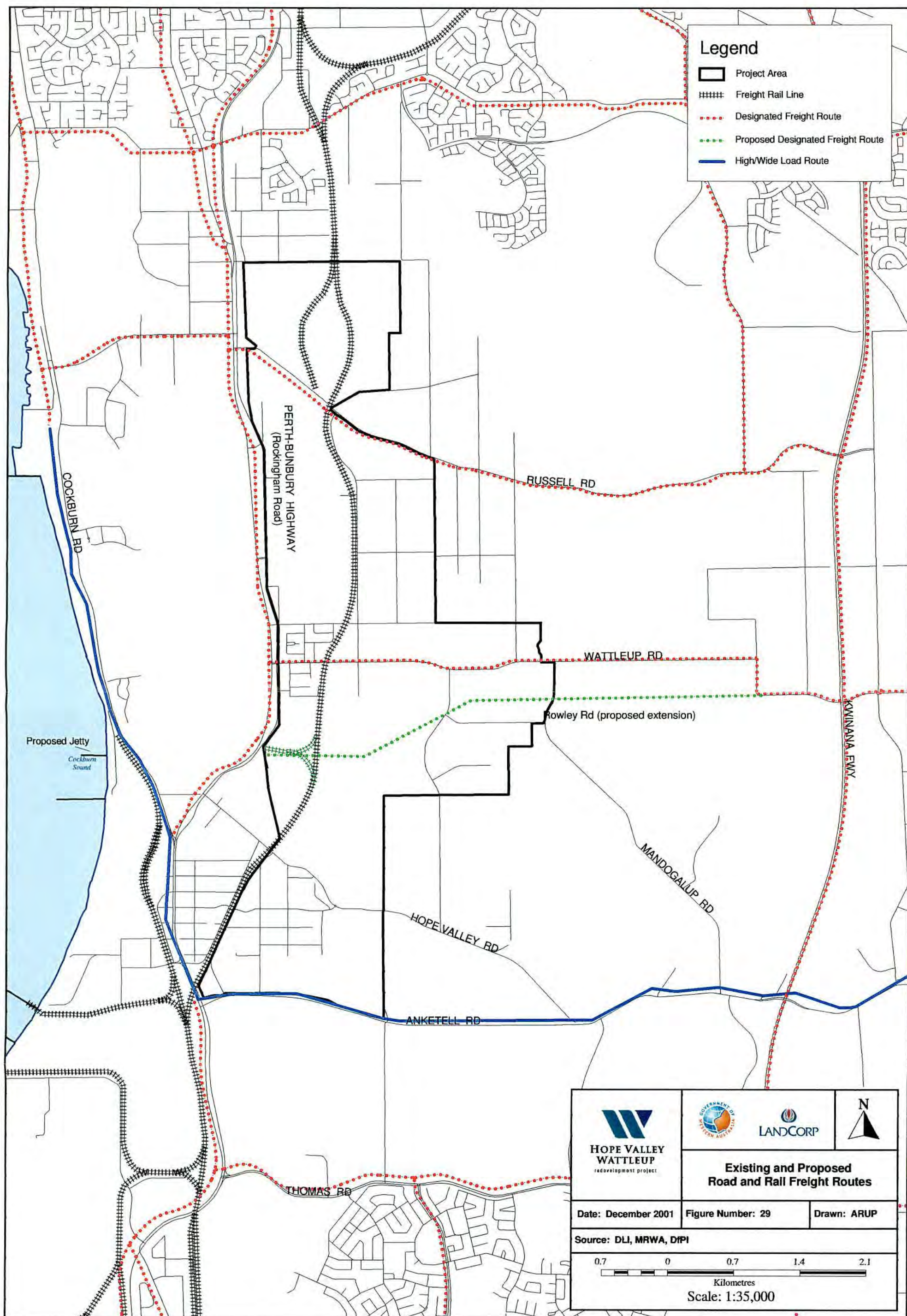




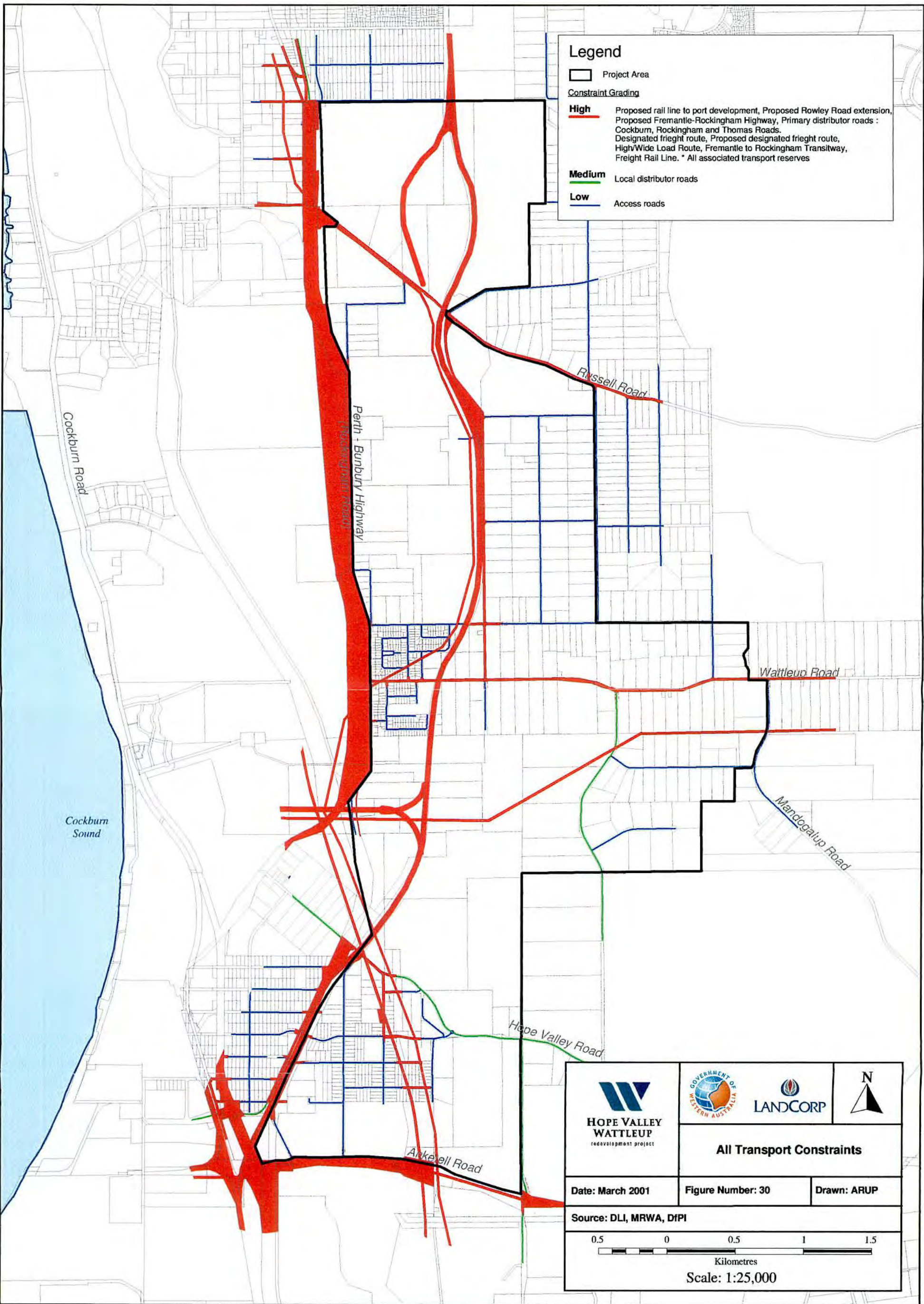


















## **APPENDIX A**

### **Environmental Protection Authority Instructions**

**ENVIRONMENTAL ASSESSMENT OF  
PLANNING SCHEMES AND THEIR  
AMENDMENTS**



**Hope Valley - Wattleup Master Plan**

**ENVIRONMENTAL REVIEW INSTRUCTIONS**

**1. Introduction**

The *Environmental Protection Act 1986* sets out that a scheme may be subject to environmental impact assessment by the Environmental Protection Authority (Section 48A of the Act).

Where a scheme is subject to an assessment by the Environmental Protection Authority (EPA), the Responsible Authority is required to produce an Environmental Review addressing the environmental factors relevant to the scheme. The EPA issues instructions for the scope and content of the Environmental Review. In this document are the instructions for the above scheme.

The Environmental Review is then made publicly available with the scheme documentation to enable members of the public and relevant agencies to comment on the possible environmental impacts of the scheme. Additional information on the purpose and functions of environmental assessment of a scheme is given in Attachment 1.

The scheme that is the subject of this assessment is called the **Hope Valley - Wattleup Master Plan**. The Master Plan is specifically identified as a scheme by the *Environmental Protection Act 1986*.

A map showing the location of the scheme area is shown as Attachment 2.

**2. Instructions**

**2.1 Status of the instructions**

The EPA, in its formulation of the instructions, endeavours to come to an agreement with the Responsible Authority and any other involved agency about the scope and content of the Environmental Review document. The EPA Service Unit provides services and facilities for the EPA. In many cases the EPA Service Unit will act for the EPA.



Other parties may also have a view about the contents of the instructions. To accommodate this additional input the instructions are subject to appeal to the Minister for the Environment and Heritage.

Where an appeal is lodged and upheld the Chief Executive Officer will issue the final instructions, consistent with the appeal decision. Where no appeals are received or all appeals are dismissed, this document comprises the final instructions for the preparation of the Environmental Review.

### **2.2 General information**

The fundamental requirements of the Environmental Review document are to:

- a) describe the state of the environment affected by the scheme, including the scheme area and its surroundings;
- b) describe the purpose of any zoning or reservation;
- c) identify those environmental factors which should be considered in relation not only to the scheme being assessed but also to later levels of planning, such as subdivision and development;
- d) for those factors relevant to the scheme being assessed, describe the extent to which the environment could be protected from both direct and indirect impacts, including:
  - identifying the portions of the environment of highest conservation value and describing how the scheme plans to protect them;
  - listing those land-uses that may be permitted or approved pursuant to the scheme requirements without further environmental approval being required;
  - predicting the potential environmental impacts of these land uses;
  - describing the scheme provisions which will allow management of those impacts to ensure the environment is protected to an acceptable level in the best manner possible; and
  - identifying potential conflicts of land uses having environmental implications and how the environmental impacts are to be managed;
- e) for those environmental factors which the proposed scheme provisions are not likely to manage, or which require alternative or later procedures or processes to address environmental management (including “deferred factors” as defined in Section 2.3 below), describe the processes (approvals and the like) necessary to address those factors, including likely referral to the EPA in the future.

The Environmental Review document should consist of sections that deal with the above requirements. The recommended format for the Environmental Review document is enclosed as Attachment 3.

An important aspect of the environmental impact assessment process is the review by the public. The EPA wants to receive public input into the possible environmental impacts of this scheme and its implementation. To facilitate adequate public input, the Environmental Review should be made available as widely as possible and at a reasonable cost.

Attachment 4 contains:

1. a list of agencies and persons who should receive free copies of the Environmental Review (including EPA members);
2. a list of places where the Environmental Review should be made available for public viewing;
3. recommended cost of the Environmental Review; and
4. methods for advertising the availability of the Environmental Review.

### **2.3 Environmental factors relevant to this scheme and deferred environmental factors**

The EPA, following consideration of the factors related to the scheme, identifies some key factors which need to be given special attention and which should form the principal basis of the EPA assessment report to the Minister for the Environment and Heritage. These key factors are termed the “environmental factors relevant to the scheme”.

The EPA has also identified other environmental factors which it considers to be relevant to the scheme but are likely to be best addressed at a later level of planning. These factors are considered to be significant enough to warrant attention as part of the Environmental Review of this scheme to the extent that the Responsible Authority should show how these factors could be addressed at a later level of planning. These factors are called “deferred environmental factors”. Note: some deferred factors have been identified for this scheme.

The EPA, in consultation with the Responsible Authority and the relevant agencies, has identified a list of factors likely to be found to be the “environmental factors relevant to the scheme” and those likely to be found to be “deferred environmental factors”. This list is provided to assist with the preparation of the Environmental Review document, but during the course of the preparation of the document other factors may be found also to be relevant, and, if so, they should be included in the detailed discussion.

A copy of the form used to identify the environmental factors (the “filtering form”) is included as Attachment 5.

### **2.4 General scope of this Environmental Review**

#### **Background - The Hope Valley - Wattleup Master Plan**

This scheme has been initiated pursuant to the *Hope Valley - Wattleup Redevelopment Act 2000* to provide development control for the core area of the approved land use strategy for the Fremantle - Rockingham Region. That strategy is known as the *Fremantle - Rockingham Industrial Area Regional Strategy* or FRIARS.

The scheme proposes a specific range of industrial and related land uses for each precinct of the scheme area, with the exception of the precinct at the eastern extremity of the scheme area (Precinct 13 on Attachment 2). It is expected that future land uses for this precinct, currently known as the Rural Precinct, will be determined after consideration of public and agency submissions received during the scheme advertising period. The acceptability of some land uses in this precinct is dependent on the outcome of the Kwinana air quality buffer review and related studies.



## ENVIRONMENTAL PROTECTION AUTHORITY

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In addition to precincts, the scheme also proposes reserves for road and rail purposes, and Parks and Recreation reserves to protect conservation areas, recreation areas and open space corridors.

The Responsible Authority for the scheme is the Western Australian Land Authority (trading as LandCorp).

### **Scope of the Environmental Review**

The scope of the Environmental Review is limited to the environmental impact assessment of the new land uses and development specifically proposed by the scheme in the Hope Valley - Wattleup Redevelopment Area (the scheme area).

### **2.5 Environmental factors relevant to the scheme**

The EPA has identified some environmental factors which are relevant to the scheme area and should be addressed in the Environmental Review document. These factors are listed below in Table 1.

**Table 1: Environmental factors relevant to the scheme**

# ENVIRONMENTAL PROTECTION AUTHORITY

CONTENT		SCOPE OF WORK	
Environmental Factor	Site specific factor	Preliminary EPA objectives (not appealable)	Work required for the Environmental Review (ER) (also address generic requirements listed in section 2.2 and attachment 3 of Instructions)
<b>INTEGRATION</b>		<b>(Cross reference as appropriate to other sections of ER)</b>	
Sustainability			<p><i>How will the scheme ensure that new development and land use allowed by the scheme meets environmental sustainability principles?</i></p> <p>Identify existing and potential sustainability issues for the scheme area having regard for State and National directions and the EPA's position statements "Towards sustainability" (October 2002) and "Principles of Environmental Protection" (October 2002).</p> <p>Examples of issues include biodiversity protection, waste disposal and greenhouse gases. In relation to greenhouse gases, consider State (including the Western Australian Greenhouse Gas Strategy), National and EPA guidelines and policy.</p> <p>Identify scheme mechanisms and complementary planning mechanisms to facilitate environmental sustainability.</p>
Land use compatibility			<p><i>How will the scheme ensure that neighbouring land uses are not unacceptably affected by any new land use or development allowed by the scheme?</i></p> <p>Identify land use compatibility issues that may potentially arise from the implementation of the scheme, including:</p> <ul style="list-style-type: none"> <li>• compatibility between neighbouring new developments in the scheme area;</li> <li>• compatibility between new uses in the scheme area, and land uses surrounding the scheme area; and</li> <li>• the transition between current land uses and the proposed vision for the scheme area.</li> </ul> <p>Discuss the management of compatibility issues relevant to each proposed precinct. How will land use compatibility issues be addressed by the scheme for each precinct?</p>
Catchment management	Cockburn Sound catchment		<p>THIS SECTION MAY BE LINKED/AMALGAMATED WITH THE DISCUSSION ON WATER QUALITY – SEE PAGE 8</p> <p><i>How will the scheme ensure that the potential impacts of new land use and development in the scheme area on the water quality of Cockburn Sound will be such that the water quality of the Sound can be maintained or improved?</i></p> <p>Explain how the scheme will integrate with management of the Cockburn Sound catchment area, including integration with the Cockburn Sound Environmental Management Plan process, Cockburn Sound land use planning work, and other Cockburn Sound catchment management initiatives.</p>



# ENVIRONMENTAL PROTECTION AUTHORITY

Environmental Factor	Site specific factor	Preliminary EPA objectives (not appealable)	Work required for the Environmental Review (ER) (also address generic requirements listed in section 2.2 and attachment 3 of Instructions)
<b>BIOPHYSICAL</b>			
Flora			<p><i>How will the values of the native flora and vegetation of the scheme area be protected?</i></p> <p>Describe the flora and vegetation of the scheme area, and its context. Clarify the extent of any botanical research carried out.</p> <p>The description should include vegetation associations (eg complexes), mapping/aerial photography showing remnant vegetation, condition, declared rare and priority flora and other species of interest, linkages and potential linkages, values and significance associated with the vegetation of the scheme area, in terms of local, regional and/or higher significance.</p> <p>Identify any existing issues related to the flora and vegetation of the scheme area, and potential issues that may arise from the implementation of the scheme. Address likely impacts on flora and vegetation. Consider linkages incorporating remnant vegetation, consolidation of remnant vegetation, enhancement of conservation areas, and revegetation/landscaping requirements.</p> <p>Describe scheme measures to address the protection of native flora. Where will native flora be retained? Revegetation/landscaping requirements? Indicate processes for further consideration of native flora at each stage of planning (eg studies before site disturbing works to check for significant flora).</p>
Fauna			<p><i>How will the values associated with native fauna and fauna habitat in the scheme area be protected?</i></p> <p>Describe the fauna likely to be found, and fauna habitats. Clarify the extent of any biological research carried out.</p> <p>Discuss the values and significance of the scheme area with respect to the factor "fauna", the potential for threatened fauna and other species of interest, and any existing and potential habitat linkages.</p> <p>Identify any existing issues related to the fauna of the scheme area, and any potential issues that may arise from the implementation of the scheme.</p> <p>Describe scheme measures to address the protection of fauna and fauna habitat. Linkages incorporating remnant vegetation? Revegetation/landscaping requirements? Indicate processes for further consideration of native fauna at each stage of planning.</p>
Wetlands			<p><i>How will the values of wetlands in and adjoining the scheme area be protected?</i></p> <p>Identify the wetlands in and adjoining the scheme area eg Long Swamp, their buffers and catchments, and management category.</p> <p>Discuss how the wetlands may be impacted, and issues relating to wetlands.</p> <p>Discuss scheme measures, and any other planning measures proposed to protect the wetlands in and near the scheme area.</p>

## ENVIRONMENTAL PROTECTION AUTHORITY

Environmental Factor	Site specific factor	Preliminary EPA objectives (not appealable)	Work required for the Environmental Review (ER) (also address generic requirements listed in section 2.2 and attachment 3 of Instructions)
Water	Surface water and groundwater		<p><i>How will new development and land use in the scheme area avoid adverse impacts on the values supported by surface and groundwater resources?</i></p> <p>Discuss issues relating to the ground and surface water resource, focussing on those issues relating to the quantity rather than quality of water, as protection of water quality to be addressed as a pollution management factor (see below). However, it is expected that the discussion in this section would closely tie in with the section on water quality below.</p>
Conservation areas	Conservation areas inside and outside the scheme area that may be influenced by activities in the scheme area		<p><i>How will potential adverse impacts from new development and land use in the scheme area on conservation areas be avoided?</i></p> <p>Identify and describe existing and proposed conservation areas within and outside the scheme area that land use and development in the scheme area have the potential to impact. These include Bush Forever sites/Regional Parks, and conservation category wetlands. Identify potential conservation areas eg areas of bushland.</p> <p>Identify existing issues, and potential impacts and issues for each conservation area (eg Rowley Rd extension). Consideration should be given to conservation, recreation and landscape protection issues and impacts to existing uses and values in the conservation areas.</p> <p>Describe the scheme measures proposed to protect and manage impacts on conservation areas, and other processes for dealing with potential activities in the scheme area that could impact on nearby conservation areas.</p>
<b>POLLUTION MANAGEMENT</b>			
Air quality	Odour, criteria pollutants, air toxics, dust and particulates		<p><i>How will the air quality of the scheme area be protected? How will adverse impacts on the air quality of sensitive land uses within and outside the scheme area potentially arising from land use and development in the scheme area, be avoided? How will land use within the scheme area be managed to ensure compatibility with air quality policies for the area?</i></p> <p>Identify existing land uses in and outside the scheme area, that may affect the air quality of the scheme area, also any land uses in the scheme area that may affect air quality outside the scheme area.</p> <p>Identify existing air quality issues and policies, and potential issues and impacts. Specifically refer to the <i>Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999</i> and NEPMs.</p> <p>Identify the scheme measures proposed to complement other processes that protect air quality.</p>



# ENVIRONMENTAL PROTECTION AUTHORITY

Environmental Factor	Site specific factor	Preliminary EPA objectives (not appealable)	Work required for the Environmental Review (ER) (also address generic requirements listed in section 2.2 and attachment 3 of Instructions)
Water quality	Surface water quality, groundwater quality and Cockburn Sound water quality		<p>NOTE: THIS SECTION MAY BE AMALGAMATED WITH A SECTION ON CATCHMENT MANAGEMENT</p> <p><i>How will the ground and surface water quality of the scheme area be protected? How will adverse impacts on Cockburn Sound water quality be avoided, and preferably water quality improved?</i></p> <p>Identify groundwater and surface water catchments relevant to the scheme area, and their significance (include wetland and Cockburn Sound catchments). Where catchment boundaries may extend outside the scheme area, indicate this.</p> <p>Discuss the existing groundwater and surface water regime, and the relationship with the Cockburn Sound marine environment.</p> <p>Discuss how ground, surface and marine water bodies may be impacted by scheme activities.</p> <p>Identify existing and potential issues relating to groundwater, surface water and marine water bodies, and the potential significance of these.</p> <p>Discuss scheme measures that address the protection of water (surface and ground), to complement any other measures being taken through other processes.</p> <p>Consider the implementation and preparation of a comprehensive water management plan for the scheme area.</p> <p>Indicate processes for further consideration of water protection at each stage of planning.</p> <p>(Discussion in this section will need to cross reference to other sections of the ER, including the wetlands section).</p>
Soil quality	Soil and groundwater contamination		<p><i>How will soil and groundwater contamination arising from new land uses and developments in the scheme area be avoided? How will any potential existing contamination be managed before new land use and development proceeds?</i></p> <p>Identify existing and potential sites (or categories of sites) that may be contaminated, and contamination issues.</p> <p>Identify potential impacts and issues.</p> <p>Identify scheme and planning measures to ensure contaminated soil and groundwater is remediated to the standard suitable for the proposed land use, to complement other (non-planning) processes.</p> <p>Identify scheme provisions to combat new contamination, and any complementary planning processes.</p>

## ENVIRONMENTAL PROTECTION AUTHORITY

Environmental Factor	Site specific factor	Preliminary EPA objectives (not appealable)	Work required for the Environmental Review (ER) (also address generic requirements listed in section 2.2 and attachment 3 of Instructions)
Noise			<p><i>How will noise amenity in the scheme area be maintained? How will adverse impacts on noise levels experienced by sensitive land uses within and outside the scheme area potentially arising from land use and development in the scheme area, be avoided?</i></p> <p>Identify existing sources of noise; existing noise issues; and potential noise issues and impacts that may arise from the implementation of the scheme.</p> <p>Identify scheme measures to manage noise.</p>
Other potential pollutants			<p><i>How will the scheme area be protected from any other potential pollutants potentially arising from new land use and development? How will adverse impacts on sensitive land uses within and outside the scheme area potentially arising from land use and development in the scheme area, be avoided?</i></p> <p>Identify any other potential pollutants and emissions that may be associated with the implementation of the scheme, and pollutants/emissions from outside that may influence land uses in the scheme area, such as radiation and light emissions; issues that may arise; and how planning, and in particular the scheme, may address these issues as far as practical.</p>
<b>SOCIAL SURROUNDINGS</b>			
Risk	Risk of a hazardous incident that may cause significant harm to an individual, the public or the environment		<p><i>How will risk levels in the scheme area be maintained at acceptable levels? How will adverse impacts on sensitive land uses within and outside the scheme area potentially arising from land use and development in the scheme area, be avoided?</i></p> <p>Indicate existing levels of risk experienced in scheme area, sources of risk, and any issues related to risk.</p> <p>Discuss potential issues - discuss the potential for future levels of risk that may affect the scheme area. Discuss the potential for activities in the scheme area to increase risk levels outside the scheme area. Consider the transport of dangerous goods and hazardous materials.</p> <p>Propose scheme measures to address risk, to complement other processes.</p>

### Other environmental factors

For context, the Environmental Review should also provide at least a summary discussion of all environmental aspects of the scheme area. For environmental factors not required to be addressed in detail (ie factors not listed in the table above such as topography, heritage, visual amenity) provide an outline description and indication of the extent of environmental management. For many of these factors, cross-referencing to the Master Plan Report may be sufficient.



During the environmental review process, should it appear that significant environmental impacts may be associated with any of these other factors, then the EPA Service Unit should be approached for advice on the work to address the factor.

### 2.6 Preliminary deferred environmental factors

- Potentially significant pollution, emissions and risk (individual and public), arising from, or affecting, land use and development in the scheme area, for which specific information was not made available to the EPA at the time of the environmental impact assessment.
- Rural Precinct issues – It is expected that land use directions for Precinct 13 (see Attachment 2), currently known as the Rural Precinct, will be determined after consideration of public and agency submissions received during the scheme advertising period. The acceptability of some land uses (eg residential, child care, accommodation) in this precinct is also dependent on the outcome of the Kwinana air quality buffer review and related studies. It has been the EPA's position that sensitive land uses are generally not appropriate in this area as it is within Area B of the *Environmental Protection (Kwinana) (Atmospheric Wastes) Policy 1999*.

Pending the outcome of the Kwinana air quality buffer review and related studies, there may be scope for some environmental factors relevant to Precinct 13 to be dealt with as "deferred factors".

## **Information on the purposes and functions of the environmental assessment of schemes and their amendments**

### **Purpose of the environmental assessment**

The purpose of an environmental assessment is to ensure that the scheme takes proper account of the relevant environmental factors. To do this the EPA reports to the Minister for the Environment and Heritage on the environmental factors relevant to the scheme, recommends environmental conditions under which the scheme may operate and provides other recommendations as it sees fit.

### **Functions of an Environmental Review**

The primary function of the Environmental Review is to provide information about the environmental factors related to the proposed scheme to the EPA to enable it to evaluate the significant effect on the environment of the scheme and provide independent environmental advice to Government.

An additional function of the document is to clearly communicate details of the proposed scheme and its future implications to the public so that the EPA can obtain informed public comment on relevant environmental factors and their areas. Effective public information and involvement is an essential part of environmental impact assessment.

These instructions are issued to assist in identifying matters that should be addressed within the Environmental Review document. However, other relevant matters may arise during the preparation of the environmental review document and these should also be included.

The Environmental Review document will be made publicly available during the advertised period for the scheme and submissions from other agencies and the public will be sought. The Responsible Authority is required to forward submissions relating to the Environmental Review to the EPA and respond to the EPA on environmental factors or conditions and procedures which may apply should the proposal be implemented that are raised in those submissions. Based on the information in the Environmental Review document, the response to submissions and its own investigations the EPA will then report to the Minister for the Environment and Heritage.

### **Please note:**

Statements of fact, conclusions or theories used to justify arguments should be substantiated and supported by technical work undertaken to prepare the Environmental Review. In addition, statements of fact, conclusions and arguments should be based on information that has a high degree of scientific certainty. Where these are not met the EPA will provide advice consistent with the precautionary principle.



**Attachment 2**

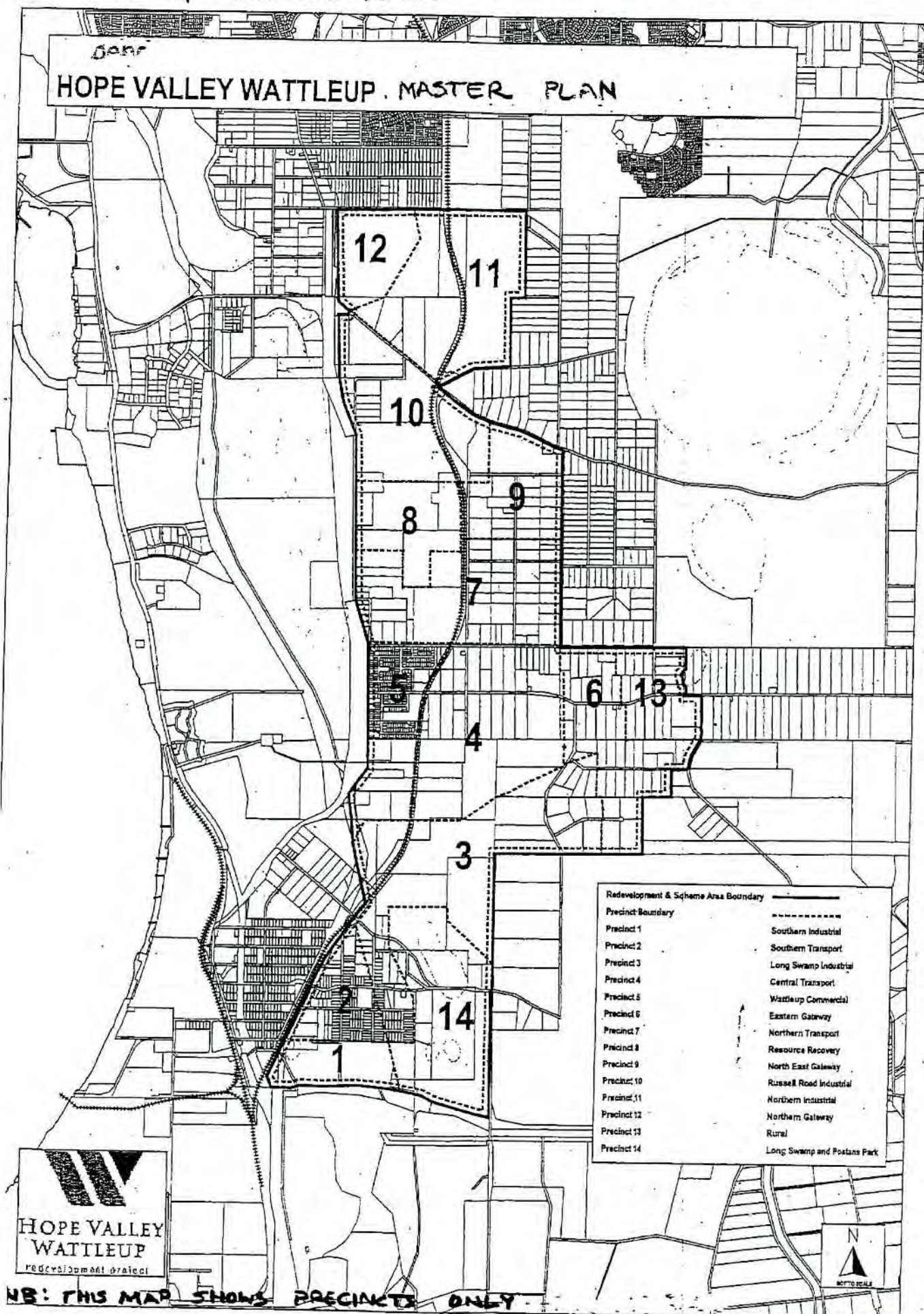
**Location of scheme area**

See attached

(Plan showing precinct numbers)

## ENVIRONMENTAL PROTECTION AUTHORITY

Location of Scheme Area





## **Environmental Review document structure**

The legislation requires that the Environmental Review document be part of the scheme documentation. For the purposes of the environmental impact assessment process, it would be useful for the Environmental Review document to be a separate volume.

The following structure is suggested:

### **1. How to make a submission**

- Include a standard sheet to guide the reader how to make a submission.

### **2. Executive summary**

### **3. Introduction**

- Clarify who is the Responsible Authority.
- Explain the background to the Environmental Review document and the environmental impact assessment process to date (eg the Environmental Review document is prepared in accordance with S48A of the *Environmental Protection Act* 1986; and, the Environmental Review document should be read in conjunction with the scheme documentation).
- Refer the reader to a process flow chart, eg from the *Planning for People* document. This could be an appendix to the Environmental Review.

### **4. Summary of scheme**

- Should include a brief description of scheme and its purpose.
- Cross reference to the scheme documentation.
- Include a clear location map.

### **5. Environmental factors relevant to the scheme**

These factors will be specified by the EPA in the final instructions. Each factor should be addressed using the following format. Illustrate using maps, aerial photographs and diagrams etc where appropriate.

#### **5.1 Environmental factor: eg wetlands**

- Provide background on the current state of the environment.
- Discuss any policies relevant to the environmental factor.

#### **5.2 Preliminary EPA objective / proposed alternative objective**

- The EPA objectives for each environmental factor will be provided to the Responsible Authority following the issuing of the final instructions (EPA objectives are not appealable).

#### **5.3 Potential impacts**

- This section should outline the potential impacts that could result from the implementation of the scheme.

### 5.4 Proposed management

- How the scheme provisions or zoning pattern address impacts on the environment.
- How scheme provisions will be implemented and how subsequent planning stages will address the impacts on the environment.

### 5.5 Proposed outcome

- Given the proposed management, can the EPA objective be met?
- On evaluation of the above (5.1. to 5.4), if it appears the EPA objective cannot be met, this section provides the opportunity to offer an alternative objective and justify why the EPA should accept the alternative objective.

## 6. Deferred environmental factors

- These will generally have been identified in the instructions.
- Alternatively, the document may argue why an environmental factor relevant to the scheme, as determined by the EPA, is considered to be a deferred factor.
- As applicable, this section may follow the same format as Section 5 above.

## 7. Summary of scheme requirements

- This section should reiterate the proposed scheme provisions or zoning pattern that address impacts on the environment (from Section 5).

## 8. References

## 9. Glossary (if necessary)

## Appendices

- 1 Flow chart of process
- 2 Copy of these instructions
- 3 etc Other information as relevant



## Attachment 4

### **Availability of Environmental Review**

#### **1. Copies for distribution free of charge**

##### **Supplied to EPA Service Unit:**

- Library / Information Centre.....9
- EPA members and Executive Officer.....6
- Officers of the DEP .....4

##### **Distributed by the responsible authority to:**

- |                        |  |
|------------------------|--|
| Libraries              | <ul style="list-style-type: none"><li>• J S Battye Library .....3</li><li>• Each City of Cockburn and Town of Kwinana Public Library .....at least one to each library</li></ul>   |
| Government departments | <ul style="list-style-type: none"><li>• Department of Planning and Infrastructure .....3</li><li>• Town of Kwinana .....at least 2</li><li>• City of Cockburn .....at least 2</li><li>• Water and Rivers Commission .....2</li><li>• Cockburn Sound Management Council.....2</li><li>• Department of Mineral and Petroleum Resources.....1</li><li>• Main Roads Western Australia.....1</li><li>• Department of Industry and Technology .....1</li><li>• Department of Conservation and Land Management...1</li><li>• Heritage Council of Western Australia.....2</li><li>• Fire and Emergency Services.....1</li><li>• servicing agencies ..... 1 to each</li></ul> |
| Other                  | <ul style="list-style-type: none"><li>• Conservation Council of WA .....1</li><li>• local community groups ..... 1 to each</li><li>• as Responsible Authority thinks fit</li></ul>   |

#### **2. Recommended cost**

The cost for the Environmental Review document should not exceed \$10 including postage for the main document, and \$10 for appendices. CDs should be made available at less cost. A copy of the Environmental Review should also be placed on the Responsible Authority's website.

#### **3. Advertising**

The responsibility for advertising the release and availability of an Environmental Review resides with the Responsible Authority and is done at their expense under the following guidelines:

**Format and content**

The format and content of the advertisement should be approved by the EPA Service Unit before appearing in the media. The advertisement should be compatible with the model advertisement below.

**Size**

As a guide, the size of the advertisement should be 2 newspaper columns (approximately 10 cm) wide by approximately 14 cm long. Dimensions less than these would be difficult to read.

**Location**

For schemes the approved advertisement should appear in the news section of the main local newspapers.

**Model advertisement**

[Scheme Title]

Environmental Review  
(Public Review Period: date to date)

[Responsible Authority] has resolved to initiate [Scheme Title] for the purposes of...

An Environmental Review (ER) has been prepared by the [Responsible Authority] to examine the environmental effects associated with the implementation of the proposed scheme, in accordance with Western Australian Government procedures. The ER describes the scheme, examines the likely environmental effects if implemented and the puts forward proposed environmental management procedures.

The Environmental Review may be viewed on the [Responsible Authority] website at [www.xxx]. Alternatively copies may be viewed at the places below or purchased for \$[X] from: [Responsible Authority Name and Contact Details]. A project summary is available free of charge from [Responsible Authority].

Copies of the Environmental Review will be available for examination at:

- |  |   |
|--|---|
| • Department of Environmental Protection | • Western Australian Land Authority [address] |
| Library Information Centre               | • Town of Kwinana libraries and Council       |
| 8th Floor, Westralia Square              | offices? [addresses]                          |
| 141 St Georges Tce                       | • City of Cockburn libraries and Council      |
| PERTH WA 6000                            | offices? [addresses]                          |

Submissions on this scheme are invited by the closing date. Submissions should be lodged with the [Responsible Authority Attention: Address].

If you have any questions on how to make a submission on the ER, please ring the EPA Service Unit project officer [Project Officer Name] on (08)9222 XXXX, or [Responsible Authority Name] on (08) 9XXX XXXX.



**Attachment 5**  
(filtering sheets)

## Department of Environmental Protection

uesday April 15 2003 9:41 AM

Record of Section 48 referrals received

Records details: CRN : 187769

File no :

Date of Letter 27/02/2003

Date Referred : 20/03/2003

Referral details: Proposal: Hope Valley-Wattleup Master Plan

TITLE AND LOCATION  
CORRECT

(Initial)

Location :

Locality : City of Cockburn , Town of Kwinana

Environmental Factors : Refer attached documentation (Decision to Assess or Not Assess Form 2) in support of recommendation based on criteria for the determination of the need for and level of environmental impact assessment in Western Australia.

Responsible Authority :

Company : Western Australian Land Authority X

Contact Person : ATT: PETER VAN GENT

Address : Locked Bag 5

Suburb : PERTH BUSINESS CENTRE

State : WA

Phone : 9482 7499

Post code : 6849

Fax : 9481 0861

Other Parties :

Local Government Authority : City of Cockburn &amp; Town of Kwinana X

Decision Making Authorities : Minister for Planning X

Involved Agencies : • Ministry for Planning X

• Cockburn Sound Management Council X

• WAPC X

• DEP &amp; WRC X Environ. Regulation

CC: • CALPX

Division and Resource

• MRWA X

Management Division X

LEVER - Kwinana Beach X

natures

Evaluation Division

Assessment officer(s): MAXINE DAWSON

Project Officer(s):

Date : 15/4/03

Manager :

Date :

Date : 15/4/02

Other divisional input (Where applicable)

Manager / Director :

Date :

Branch / Division :

Manager / Director :

Date :

Branch / Division :

Other Information :

Assessment Number :

1470

Date : 15/4/03 23/4/03

Checked by :



## INFORMATION FOR USE IN DETERMINING LEVEL OF ASSESSMENT FOR SCHEMES AND SCHEME AMENDMENTS UNDER SECTION 48A

### Summary

	Yes	No	N/A
Does the scheme/amendment impact any biophysical factors?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Does the scheme/amendment impact any pollution management factors?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Does the scheme/amendment impact any social surroundings factors?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
Does the scheme/amendment conform to existing policies, guidelines and criteria for EIA?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Is further information required to determine level of assessment?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	

### RECOMMENDED LEVEL OF ASSESSMENT:

DEP Correspondence	<input type="checkbox"/>
EPA Referral - More Information Requested	<input type="checkbox"/>
Level 1 Assessment - Not assessed, no advice given	<input type="checkbox"/>
Level 2 Assessment - Not assessed, non-binding advice given	<input type="checkbox"/>
Level 3 Assessment - Assessed, Environmental Review Required	<input checked="" type="checkbox"/>
Incapable of Being Made Environmentally Acceptable	<input type="checkbox"/>

### Summary For Inclusion In Report To Chairman:

#### ENVIRONMENTAL FACTORS:

WETLANDS, BUSHLAND, POLLUTION FACTORS INCLUDING AIR, WATER, SOIL, NOISE & RISK. LANDUSE COMPATIBILITY; COCKBURN SOUND WATER QUALITY.

#### POTENTIALLY SIGNIFICANT EFFECTS:

DEVELOPMENT IMPACTS ON SIGNIFICANT WETLANDS & BUSHLAND; POLLUTION DUE TO NEW INDUSTRIAL DEVELOPMENT; IMPACTS ON COCKBURN SOUND WATER QUALITY; LAND USE CONFLICTS

#### MANAGEMENT:

VIA FORMAL ASSESSMENT/CONDITIONS.

ENVIRONMENTAL SIGNIFICANCE

LOW

MEDIUM

**HIGH**

ENVIRONMENTAL MATTERS	COMMENTS AND POSSIBLE IMPACTS																																													
<p><b>SECTION A: BIOPHYSICAL</b></p> <p><b>1. Does the scheme/amendment impact on areas of highest conservation value?</b></p> <p>(If 'Yes' tick the appropriate box below; if 'No' then proceed to 2.)</p> <p>The area covered by the scheme/amendment involves or is adjacent to:</p> <table border="0"> <thead> <tr> <th></th> <th>Incl.</th> <th>Adj</th> </tr> </thead> <tbody> <tr> <td>• Land covered by recommendations for protection in the System 'Red Book' report;</td> <td><input type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>• Land vested in NPNCA for the purpose of:</td> <td></td> <td></td> </tr> <tr> <td>    • conservation of flora and fauna;</td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> </tr> <tr> <td>    • National Park; or</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>    • Conservation Park.</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Other areas recommended for reservation by CALM and endorsed by Govt. for inclusion in CALM's Estate;</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Land reserved as "Parks and Recreation" under the MRS;</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Areas managed for multiple use where conservation is one defined use;</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Areas with rare vegetation communities or assemblages not adequately represented in secure conservation areas (eg Bushplan, TOPRPC);</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Land known to contain declared rare flora and fauna;</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Land containing areas thought to be the habitat of Specially Protected (Threatened) Fauna;</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Areas known or suspected to contain karst landforms;</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Land listed as World heritage; or</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• Land listed by the Australian Heritage Commission.</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </tbody> </table> <p>Will the scheme/scheme amendment allow for any land clearing and, if so, does Commissioner for Soil and Land Conservation approval need to be obtained?</p> <p><input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p>		Incl.	Adj	• Land covered by recommendations for protection in the System 'Red Book' report;	<input type="checkbox"/>	<input checked="" type="checkbox"/>	• Land vested in NPNCA for the purpose of:			• conservation of flora and fauna;	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	• National Park; or	<input type="checkbox"/>	<input type="checkbox"/>	• Conservation Park.	<input type="checkbox"/>	<input type="checkbox"/>	• Other areas recommended for reservation by CALM and endorsed by Govt. for inclusion in CALM's Estate;	<input type="checkbox"/>	<input type="checkbox"/>	• Land reserved as "Parks and Recreation" under the MRS;	<input type="checkbox"/>	<input type="checkbox"/>	• Areas managed for multiple use where conservation is one defined use;	<input type="checkbox"/>	<input type="checkbox"/>	• Areas with rare vegetation communities or assemblages not adequately represented in secure conservation areas (eg Bushplan, TOPRPC);	<input type="checkbox"/>	<input type="checkbox"/>	• Land known to contain declared rare flora and fauna;	<input type="checkbox"/>	<input type="checkbox"/>	• Land containing areas thought to be the habitat of Specially Protected (Threatened) Fauna;	<input type="checkbox"/>	<input type="checkbox"/>	• Areas known or suspected to contain karst landforms;	<input type="checkbox"/>	<input type="checkbox"/>	• Land listed as World heritage; or	<input type="checkbox"/>	<input type="checkbox"/>	• Land listed by the Australian Heritage Commission.	<input type="checkbox"/>	<input type="checkbox"/>	
	Incl.	Adj																																												
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• Conservation Park.	<input type="checkbox"/>	<input type="checkbox"/>																																												
• Other areas recommended for reservation by CALM and endorsed by Govt. for inclusion in CALM's Estate;	<input type="checkbox"/>	<input type="checkbox"/>																																												
• Land reserved as "Parks and Recreation" under the MRS;	<input type="checkbox"/>	<input type="checkbox"/>																																												
• Areas managed for multiple use where conservation is one defined use;	<input type="checkbox"/>	<input type="checkbox"/>																																												
• Areas with rare vegetation communities or assemblages not adequately represented in secure conservation areas (eg Bushplan, TOPRPC);	<input type="checkbox"/>	<input type="checkbox"/>																																												
• Land known to contain declared rare flora and fauna;	<input type="checkbox"/>	<input type="checkbox"/>																																												
• Land containing areas thought to be the habitat of Specially Protected (Threatened) Fauna;	<input type="checkbox"/>	<input type="checkbox"/>																																												
• Areas known or suspected to contain karst landforms;	<input type="checkbox"/>	<input type="checkbox"/>																																												
• Land listed as World heritage; or	<input type="checkbox"/>	<input type="checkbox"/>																																												
• Land listed by the Australian Heritage Commission.	<input type="checkbox"/>	<input type="checkbox"/>																																												



ENVIRONMENTAL MATTERS	COMMENTS AND POSSIBLE IMPACTS																																
<p><b>2. Does the area covered by the scheme/amendment include any water resources of highest conservation value?</b></p> <div style="text-align: right;"> <div style="border: 1px solid black; padding: 2px; display: inline-block;"> <div style="border: 1px solid black; border-radius: 50%; padding: 2px; display: inline-block;">YES</div> <div style="border: 1px solid black; padding: 2px; display: inline-block;">NO</div> </div> </div> <p>(If 'Yes' proceed to 2.1 below; if 'No' proceed to Section B, page 7)</p> <p><b>2.1 Wetlands, Watercourses &amp; Rivers</b></p> <p>The area covered by the scheme/amendment involves a wetland, watercourse or river:</p> <table border="0"> <thead> <tr> <th></th> <th>Incl</th> <th>Adj</th> <th>Drain into</th> </tr> </thead> <tbody> <tr> <td>• nominated for protection in the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992;</td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• nominated for protection in the draft EPP for Lakes and Swamps of the South West Agricultural Zone;</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• recommended for protection in the Systems 'Red Book' reports;</td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• on land vested in the National Parks and Nature Conservation Authority for the purpose of Conservation of Flora and Fauna, National Park or Conservation Park, or areas recommended, and endorsed by Government, for inclusion in CALM estate for conservation purposes;</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• in areas reserved as "Parks and Recreation" under the Metropolitan Regional Scheme;</td> <td><input checked="" type="checkbox"/></td> <td><input checked="" type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• in areas with rare vegetation communities considered by the EPA not adequately represented in secure conservation areas, or rare flora and fauna and their habitats, eg those areas identified in Perth's Bushplan;</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>• recognised by international agreements because of their importance primarily for waterbirds and their habitats.</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </tbody> </table> <p>Conservation category (if known) _____</p> <p>Further information: _____</p> <p>_____</p>		Incl	Adj	Drain into	• nominated for protection in the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992;	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	• nominated for protection in the draft EPP for Lakes and Swamps of the South West Agricultural Zone;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• recommended for protection in the Systems 'Red Book' reports;	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	• on land vested in the National Parks and Nature Conservation Authority for the purpose of Conservation of Flora and Fauna, National Park or Conservation Park, or areas recommended, and endorsed by Government, for inclusion in CALM estate for conservation purposes;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• in areas reserved as "Parks and Recreation" under the Metropolitan Regional Scheme;	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	• in areas with rare vegetation communities considered by the EPA not adequately represented in secure conservation areas, or rare flora and fauna and their habitats, eg those areas identified in Perth's Bushplan;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	• recognised by international agreements because of their importance primarily for waterbirds and their habitats.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
	Incl	Adj	Drain into																														
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• nominated for protection in the draft EPP for Lakes and Swamps of the South West Agricultural Zone;	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																														
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• recognised by international agreements because of their importance primarily for waterbirds and their habitats.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>																														

ENVIRONMENTAL MATTERS	COMMENTS AND POSSIBLE IMPACTS
<p><b>2.2 Estuaries and Inlets</b></p> <p>The area covered by the scheme/amendment involves:</p> <p style="text-align: right;">Incl Adj Drain into</p> <ul style="list-style-type: none"> <li>• an estuary or inlet. <span style="float: right;"><input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/></span></li> </ul> <p>Name of estuary or inlet: _____</p> <p>_____</p>	
<p><b>2.3 Coastline and Near-shore Marine areas.</b></p> <p>The area covered by the scheme/amendment involves a coastline or near-shore marine area:</p> <p style="text-align: right;">Incl. Adj</p> <ul style="list-style-type: none"> <li>• recommended for protection in the Systems Red Books' reports; <span style="float: right;"><input type="checkbox"/> <input type="checkbox"/></span></li> <li>• with mangroves present; <span style="float: right;"><input type="checkbox"/> <input type="checkbox"/></span></li> <li>• identified by CALM for inclusion on the List of Wetlands of International Importance (RAMSAR); <span style="float: right;"><input type="checkbox"/> <input type="checkbox"/></span></li> <li>• recommended by CALM for inclusion in its estate for conservation purposes; <span style="float: right;"><input type="checkbox"/> <input type="checkbox"/></span></li> <li>• reserved for "Parks and Recreation" under the Metropolitan Region Scheme; <span style="float: right;"><input type="checkbox"/> <input type="checkbox"/></span></li> <li>• with rare vegetation communities considered by the EPA not adequately represented in secure conservation reserves, or rare flora and fauna and their habitats; <span style="float: right;"><input type="checkbox"/> <input type="checkbox"/></span></li> <li>• where recreational usage is high, such as beaches in the metropolitan region. <span style="float: right;"><input type="checkbox"/> <input checked="" type="checkbox"/></span></li> </ul> <p>Further information: <u>COCKBURN SOUND</u></p> <p>_____</p>	



ENVIRONMENTAL MATTERS	COMMENTS AND POSSIBLE IMPACTS
<p><b>2.5 Public Water Source Areas - Groundwater or Surface Water</b></p> <p>The area covered by the scheme/amendment involves: <span style="float: right;">Yes</span></p> <ul style="list-style-type: none"> <li>• a proposed or existing groundwater source area:               <ul style="list-style-type: none"> <li>• Priority 1 UWPCA; <span style="float: right;"><input type="checkbox"/></span></li> <li>• Priority 2 UWPCA; <span style="float: right;"><input type="checkbox"/></span></li> <li>• Priority 3 UWPCA. <span style="float: right;"><input type="checkbox"/></span></li> </ul> </li> <li>either               <ul style="list-style-type: none"> <li>• Jandakot Mound, or <span style="float: right;"><input type="checkbox"/></span></li> <li>• Gnangara Mound <span style="float: right;"><input type="checkbox"/></span></li> </ul> </li> <li>• a proposed UWPCA groundwater source area:               <ul style="list-style-type: none"> <li>• Priority 1; <span style="float: right;"><input type="checkbox"/></span></li> <li>• Priority 2; <span style="float: right;"><input type="checkbox"/></span></li> <li>• Priority 3; <span style="float: right;"><input type="checkbox"/></span></li> </ul> </li> <li>• Water and Rivers Commission gazetted groundwater areas outside the Perth metropolitan area;               <ul style="list-style-type: none"> <li>• Priority 1; <span style="float: right;"><input type="checkbox"/></span></li> <li>• Priority 2; <span style="float: right;"><input type="checkbox"/></span></li> <li>• Priority 3; <span style="float: right;"><input type="checkbox"/></span></li> </ul> </li> <li>• any surface catchments where water is collected for public water supply purposes. <span style="float: right;"><input type="checkbox"/></span></li> </ul> <p>Indicate priority (if known) _____</p>	
<p><b>2.6 Catchments (Surface and Ground Water) With Special Requirements</b></p> <p>The area covered by the scheme/amendment involves: <span style="float: right;">Yes</span></p> <ul style="list-style-type: none"> <li>• Lake Clifton; <span style="float: right;"><input type="checkbox"/></span></li> <li>• Swan Coastal Plain Catchment of the Peel-Harvey Estuary; <span style="float: right;"><input type="checkbox"/></span></li> <li>• Swan and Canning Rivers and Ellen Brook; <span style="float: right;"><input type="checkbox"/></span></li> <li>• Lake Forrestdale; <span style="float: right;"><input type="checkbox"/></span></li> </ul>	

ENVIRONMENTAL MATTERS	COMMENTS AND POSSIBLE IMPACTS
<p>• Thomsons Lake; <input type="checkbox"/></p> <p>• Other: <u>COLKBURN SOUND</u></p>	
<p><b>SECTION B:</b></p> <p><b><u>POLLUTION MANAGEMENT</u></b></p> <p><b>1. Would the scheme/amendment allow for a land-use which will or could discharge a pollutant?</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>(If 'Yes' indicate the appropriate category(s) by ticking the boxes and give a brief description of industry/land-use; if 'No' proceed to question 2 below)</p> <p>Type of pollutant:</p> <ul style="list-style-type: none"> <li>• Gases <input checked="" type="checkbox"/></li> <li>• Noise <input checked="" type="checkbox"/></li> <li>• Dust <input checked="" type="checkbox"/></li> <li>• Odour <input checked="" type="checkbox"/></li> <li>• Other (specify): <input checked="" type="checkbox"/></li> </ul>	
<p><b>2. Would the scheme allow for a land-use which requires a buffer?</b> <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>(If 'Yes' give a brief description of land-use; if 'No' proceed to question 3 below)</p> <p>What is the distance to the nearest residence? _____</p> <p>What is the recommended buffer distance? _____</p> <p><b>3. Would the scheme allow for a residential area to encroach into an existing buffer area?</b> <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p>(If 'Yes' give a brief description below; if 'No' proceed to question 4 on page 8)</p> <p>What is the industry involved? _____</p>	



ENVIRONMENTAL MATTERS	COMMENTS AND POSSIBLE IMPACTS
<p><b>4. Has the site been the subject of a past land-use which could contaminate the soil or groundwater?</b></p> <p>(If 'Yes' indicate the appropriate category(s) by ticking the boxes; if 'No' proceed to question 5 below)</p> <p><b>4.1 Does the existing or past land-use include one of the following industries?</b></p> <ul style="list-style-type: none"> <li>acid/alkali plant <input type="checkbox"/></li> <li>agricultural/horticultural activities <input type="checkbox"/></li> <li>airport <input type="checkbox"/></li> <li>asbestos production/disposal <input type="checkbox"/></li> <li>chemicals manufacture &amp; formulation <input type="checkbox"/></li> <li>defence works <input type="checkbox"/></li> <li>drum re-conditioning works <input type="checkbox"/></li> <li>dry cleaning establishment <input type="checkbox"/></li> <li>electrical manufacturing <input type="checkbox"/></li> <li>electroplating &amp; heat treatment <input type="checkbox"/></li> <li>engine works <input type="checkbox"/></li> <li>explosives industry <input type="checkbox"/></li> <li>gas works <input type="checkbox"/></li> <li>iron &amp; steel works <input type="checkbox"/></li> <li>landfill sites <input type="checkbox"/></li> <li>metal treatment <input type="checkbox"/></li> <li>mining &amp; extractive industries <input type="checkbox"/></li> <li>oil production/storage <input type="checkbox"/></li> <li>paint formulation/manufacture <input type="checkbox"/></li> <li>pesticide manufacture/formulation <input type="checkbox"/></li> <li>pharmaceutical manufacture/formulation <input type="checkbox"/></li> <li>power stations <input type="checkbox"/></li> <li>railway yards <input type="checkbox"/></li> <li>scrap yards <input type="checkbox"/></li> <li>service stations <input type="checkbox"/></li> <li>sheep and cattle dips <input type="checkbox"/></li> <li>smelting and refining <input type="checkbox"/></li> <li>tanning and associated trades <input type="checkbox"/></li> <li>waste storage and treatment <input type="checkbox"/></li> <li>wood preservation <input type="checkbox"/></li> <li>other _____</li> </ul>	

ENVIRONMENTAL MATTERS	COMMENTS AND POSSIBLE IMPACTS
<p><b>5. Is the site on land which requires offsite disposal of drainage waters?</b></p> <p>ie. Does the land have a high water table or is the soil predominantly clay?</p> <p>(If 'Yes' give a brief description of the land; if 'No' proceed to question 6 below)</p> <p style="text-align: right;">YES <input checked="" type="checkbox"/> NO <input type="checkbox"/></p>	
<p><b>6. Would the scheme/amendment allow for the dredging of rivers and/or marine environments?</b></p> <p>(If 'Yes' indicate the appropriate category by ticking the boxes and give a brief description of the extent of the project; if 'No' proceed to question 7 below)</p> <ul style="list-style-type: none"> <li>• developmental dredging <input type="checkbox"/></li> <li>• disposal of dredge material within a river system <input type="checkbox"/></li> <li>• other <input type="checkbox"/></li> </ul> <p style="text-align: right;">YES <input type="checkbox"/> NO <input checked="" type="checkbox"/></p>	
<p><b>7. Would the scheme/amendment allow for a land-use change that is inconsistent with the Kwinana EPP for Atmospheric Wastes?</b></p> <p>(If 'Yes' give a brief description of the change in land-use; if 'No' proceed to question 8 below)</p> <p style="text-align: right;">YES <input type="checkbox"/> NO <input type="checkbox"/> POSSIBLY</p>	
<p><b>8. Would the scheme/amendment allow a land-use which requires special management?</b></p> <p>(If 'Yes' indicate the appropriate category by ticking the boxes and give a brief description; if 'No' proceed to question 9 below)</p> <p>The land-use is one of the following:</p> <ul style="list-style-type: none"> <li>• Horticulture <input type="checkbox"/></li> <li>• Heavy Industry <input type="checkbox"/></li> <li>• Marina <input type="checkbox"/></li> <li>• Aquaculture <input type="checkbox"/></li> <li>• Industry requiring licensing under Part V of the Environmental Protection Act <input type="checkbox"/></li> <li>• Other <input type="checkbox"/></li> </ul> <p style="text-align: right;">YES <input checked="" type="checkbox"/> NO <input type="checkbox"/></p>	



**SECTION C:****SOCIAL SURROUNDINGS**

**1. Does the scheme/amendment raise any issues known to be of concern or controversy to the community?**

☒ YES ☐ NO

(If 'Yes' indicate the appropriate category by ticking the boxes and give a brief description of the concern; if 'No' proceed to question 2 below)

Is the concern to the public related to:

- an issue of environmental significance ☒
- another issue: ☐ \_\_\_\_\_

Give details (eg known public interest groups; environmental issue(s) of concern):

Further information: \_\_\_\_\_

**2. Would the scheme/amendment pose any threat to public safety or is it a generator of risk?**

☒ YES ☐ NO

(If 'Yes' please indicate by ticking the appropriate box; if 'No' proceed to question 3 below)

Is the threat to public safety the result of:

- a new industry being located near an existing residential area; or ☒
- a new residential area being located near an existing industry? ☐

Further information: \_\_\_\_\_

**3. Would the scheme/amendment impact any areas known to have cultural significance?**

☐ YES ☐ NO

Please indicate:

- Aboriginal culture and heritage ☐
- Non-indigenous heritage ☐

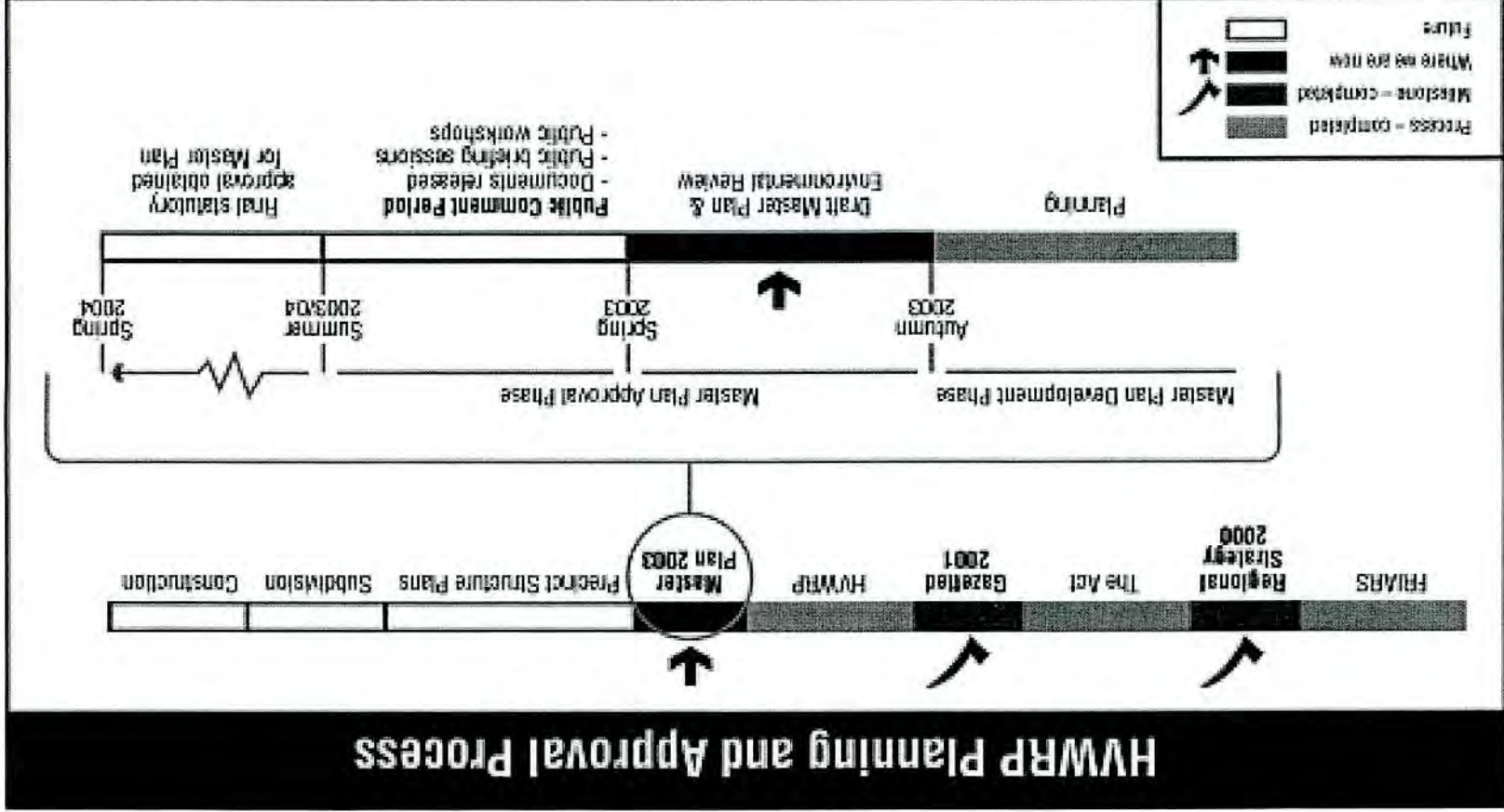
Further information: \_\_\_\_\_

## **APPENDIX B**

### **Flowchart of Hope Valley-Wattleup Redevelopment Project Planning and Approval Process**



# HVWRP Planning and Approval Process



## **APPENDIX C**

### **DCLM Declared Rare and Priority Flora List**



**DCLM Declared Rare and Priority Flora List, July 2003.**

<i>Acacia lasiocarpa</i> var. <i>bracteolata</i>	
long peduncle variant (G.J. Keighery5026)	P1
<i>Anthotium junciforme</i>	P4
<i>Aotus cordifolia</i>	P3
<i>Apopogeton hexatepalus</i>	P4
<i>Caladenia huegelii</i>	R
<i>Diuris micrantha</i>	R
<i>Dodonaea hackettiana</i>	P4
<i>Drakaea elastica</i>	R
<i>Grevillea olivacea</i>	P4
<i>Microtis media</i>	P4
<i>Phlebocarya pilosissima</i>	P3
<i>Tripterococcus paniculatus</i> ms	P1

**APPENDIX D**

**WA Museum Fauna List**



## Species List from Western Australian Museum Bird Database, 11/07/2003

N.B. Shading indicates significant birds on the Swan Coastal Plain portion of the Perth Metropolitan Region in Table 15, Bush Forever (Government of Western Australia, 2000)

### Taxon

#### ACANTHIZIDAE

<i>Acanthiza</i>	<i>apicalis</i>	
<i>Acanthiza</i>	<i>inornata</i>	
<i>Gerygone</i>	<i>fusca</i>	
<i>Sericornis</i>	<i>frontalis</i>	<i>maculatus</i>

#### ACCIPITRIDAE

<i>Accipiter</i>	<i>fasciatus</i>	<i>fasciatus</i>
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#### ANATIDAE

<i>Anas</i>	<i>castanea</i>	
<i>Malacorhynchus</i>	<i>membranaceus</i>	
<i>Oxyura</i>	<i>australis</i>	
<i>Stictonetta</i>	<i>naevosa</i>	

#### ARTAMIDAE

<i>Artamus</i>	<i>cinereus</i>	
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#### CAMPEPHAGIDAE

<i>Coracina</i>	<i>novaehollandiae</i>	
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#### CHARADRIIDAE

<i>Charadrius</i>	<i>melanops</i>	
<i>Charadrius</i>	<i>ruficapillus</i>	
<i>Charadrius</i>	<i>veredus</i>	
<i>Erythrogonys</i>	<i>cinctus</i>	
<i>Vanellus</i>	<i>tricolor</i>	

#### DIOMEDEIDAE

<i>Diomedea</i>	<i>chrysostoma</i>	
<i>Diomedea</i>	<i>exulans</i>	<i>chionoptera</i>

#### HALCYONIDAE

<i>Todiramphus</i>	<i>sanctus</i>	<i>sanctus</i>
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#### HIRUNDINIDAE

<i>Cheramoeca</i>	<i>leucosternus</i>	
<i>Hirundo</i>	<i>neoxena</i>	

#### LARIDAE

<i>Sterna</i>	?	
<i>Sterna</i>	<i>hirundo</i>	<i>hirundo</i>
<i>Sterna</i>	<i>hybrida</i>	<i>javanica</i>

#### MALURIDAE

<i>Malurus</i>	<i>splendens</i>	
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#### MELIPHAGIDAE

<i>Anthochaera</i>	<i>carunculata</i>	
<i>Anthochaera</i>	<i>lunulata</i>	
<i>Epthianura</i>	<i>albifrons</i>	
<i>Lichmera</i>	<i>indistincta</i>	<i>indistincta</i>
<i>Melithreptus</i>	<i>chloropsis</i>	
<i>Phylidonyms</i>	<i>nigra</i>	
<i>Phylidonyms</i>	<i>novaehollandiae</i>	

#### PSITTACIDAE

<i>Platycercus</i>	<i>spurius</i>	
<i>Platycercus</i>	<i>zonarius</i>	
<i>Platycercus</i>	<i>zonarius</i>	<i>semitorquatus</i>
<i>Trichoglossus</i>	<i>haematodus</i>	<i>rubritorquis</i>

#### RALLIDAE

<i>Fulica</i>	<i>atra</i>	<i>australis</i>
<i>Gallinula</i>	<i>tenebrosa</i>	<i>tenebrosa</i>
<i>Porphyrio</i>	<i>porphyrio</i>	<i>bellus</i>
<i>Porzana</i>	<i>tabuensis</i>	

#### RECURVIROSTRIDAE

<i>Cladorhynchus</i>	<i>leucocephalus</i>	
<i>Himantopus</i>	<i>himantopus</i>	<i>leucocephalus</i>
<i>Recurvirostra</i>	<i>novaehollandiae</i>	

#### SCOLOPACIDAE

<i>Calidris</i>	<i>acuminata</i>	
<i>Tringa</i>	<i>hypoleucos</i>	
<i>Tringa</i>	<i>stagnatilis</i>	

#### SPHENISCIDAE

<i>Eudyptula</i>	<i>minor</i>	<i>novaehollandiae</i>
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#### STRIGIDAE

<i>Ninox</i>	<i>novaeseelandiae</i>	<i>boobook</i>
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**COLUMBIDAE***Phaps* *chalcoptera***CORVIDAE***Corvus* *splendens***CRACTICIDAE***Cracticus* *tibicen* *dorsalis**Cracticus* *torquatus**Strepera* *versicolor***DICRURIDAE***Grallina* *cyanoleuca**Rhipidura* *leucophrys***PASSERIDAE***Passer* *montanus***PODICIPEDIDAE***Tachybaptus* *novaehollandiae* *novaehollandiae***PROCELLARIIDAE***Daption* *capense**Macronectes* *giganteus**Pachyptila* *salvini**Pachyptila* *turtur**Pterodroma* *brevirostris**Puffinus* *assimilis* *assimilis***SYLVIIDAE***Acrocephalus* *australis* *gouldi***TURNICIDAE***Turnix* *varia***TYTONIDAE***Tyto* *alba* *delicatula***ZOSTEROPIDAE***Zosterops* *lateralis* *gouldi*



# Species List from Western Australian Museum Mammal Database, 11/07/2003

## Dasyuridae

*Phascogale*      *tapoatafa*      *tapoatafa*

## Delphinidae

*Tursiops*      *truncatus*

## Macropodidae

*Setonix*      *brachyurus*

## Muridae

*Hydromys*      *chrysogaster*

*Mus*      *musculus*

## Mustelidae

*Mustela*      *putorius*

## Neobalaenidae

*Caperea*      *marginata*

## Otariidae

*Neophoca*      *cinerea*

## Peramelidae

*Isodon*      *obesulus*      *fusciventer*

## Suidae

*Sus*      *scrofa*

## Tarsipedidae

*Tarsipes*      *rostratus*

## Vespertilionidae

*Chalinolobus*      *gouldii*

*Nyctophilus*      *timoriensis*      *timoriensis*

*Vespadelus*      *regulus*

**Species List from Western Australian Museum Reptile Database, 11/07/2003**

**Agamidae**

*Pogona*            *minor*            *minor*  
*Rankinia*            *adelaidensis*

**Cheloniidae**

*Caretta*            *caretta*

**Elapidae**

*Brachyurophis*    *semifasciata*  
*Demansia*        *psammophis*    *reticulata*  
*Elapognathus*    *coronatus*  
*Hydrophis*        *elegans*  
*Hydrophis*        *ocellatus*  
*Neelaps*            *bimaculatus*  
*Neelaps*            *calonotos*  
*Notechis*          *scutatus*  
*Parasuta*          *gouldii*  
*Pelamis*           *platyura*  
*Pseudonaja*       *nuchalis*  
*Pseudonaja*       *affinis*            *affinis*  
*Simoselaps*       *bertholdi*  
*Simoselaps*       *littoralis*

**Gekkonidae**

*Christinus*            *marmoratus*  
*Strophurus*            *spinigerus*

**Hylidae**

*Litoria*                *adelaidensis*  
*Litoria*                *moorei*

**Myobatrachidae**

*Crinia*                *glauerti*  
*Crinia*                *insignifera*  
*Heleioporus*  
*Heleioporus*            *eyrei*  
*Limnodynastes*        *dorsalis*  
*Myobatrachus*        *gouldii*  
*Pseudophryne*        *guentheri*

**Pygopodidae**

*Aprasia*                *repens*  
*Delma*                *fraseri*            *fraseri*  
*Lialis*                *burtonis*  
*Pletholax*            *gracilis*            *gracilis*  
*Pygopus*                *lepidopodus*

**Scincidae**

*Acritoscincus*            *trilineatus*  
*Cryptoblepharus*        *plagiocephalus*  
*Ctenotus*                *australis*  
*Ctenotus*                *fallens*  
*Ctenotus*                *gemmula*  
*Hemiergis*                *quadrilineata*  
*Lerista*                *christinae*  
*Lerista*                *elegans*  
*Lerista*                *lineata*  
*Menetia*                *greyii*  
*Morethia*                *lineocellata*  
*Morethia*                *obscura*  
*Tiliqua*                *occipitalis*  
*Tiliqua*                *rugosa*            *rugosa*

**Typhlopidae**

*Ramphotyphlops*        *australis*

**Varanidae**

*Varanus*                *gouldii*



## **APPENDIX E**

**Wetland-Dependent Vegetation Boundary Mapping and Identification of  
Potential Conservation Areas for consideration in Future Structure Planning**

## **HOPE VALLEY – WATTLEUP REDEVELOPMENT PROJECT**

### **WETLAND-DEPENDENT VEGETATION BOUNDARY MAPPING AND IDENTIFICATION OF POTENTIAL CONSERVATION AREAS FOR CONSIDERATION IN FUTURE STRUCTURE PLANNING**

#### **INTRODUCTION**

The Hope Valley – Wattleup Proposed Master Plan (HVWMP) originally proposed Parks and Recreation (P&R) Reservation in the south of the Hope Valley – Wattleup Redevelopment Area, based generally on the retention of Long Swamp, Hendy Road Swamps, and Conway Road Swamp. However the proposed P&R reserve included relatively large areas of market garden adjacent to Abercrombie and Anketell Roads, and excluded vegetated areas between Conway Road Swamp and the Hendy Road Swamps.

In its consideration of the HVWPMP, the Western Australian Planning Commission required that the boundaries of the southern proposed P&R reserves be reviewed to consider the current environmental values of the area. Further, the identification of potential conservation areas for consideration in future structure planning should be undertaken.

This was undertaken by Bowman Bishaw Gorham in November, 2003 through:

- Mapping and review of current Department of Environment (Water and Rivers Commission) wetland boundaries;
- Updating the wetland mapping based on the determination of current wetland dependent vegetation using current aerial photography and ground-truthing (using GPS where necessary);
- Conducting broad-scale vegetation condition mapping for upland areas in accordance with *Bush Forever* criteria;
- Logically recognising cadastral and other planning boundaries;
- Recognising the importance of the long-term viability of the ultimate reserve proposal; and
- Proposing possible areas for conservation in the south of the HVWRA to be considered at the structure planning stage of the precincts, based on the outcomes of the preceding tasks.



## **WETLANDS**

The original wetland mapping for Long Swamp, Hendy Road Swamps, and Conway Road Swamp provided by the Department of Environment (DoE - Water and Rivers Commission), together with 50m and 200m buffers, is provided as Figure A on aerial photography.

Figure B presents the ground-truthed boundary of wetland dependent vegetation for each wetland, together with a 50m buffer. Each wetland is considered further below.

### **Conway Road Swamp**

Conway Road Swamp is a dampland with an assigned Resource Enhancement management category. It is not protected under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*.

The ground-truthing of the DoE mapping for the Conway Road Swamp indicates that the wetland area is slightly larger than originally mapped, generally extending further south.

Vegetation belongs to the Cottesloe Complex – Central & South (Heddlé *et al.*, 1980), and consists predominantly of *Eucalyptus rudis* / *Melaleuca raphiophylla* woodland over *Xanthorrhoea preissii*, *Gahnia trifida*, and *Acacia saligna*.

Vegetation condition is generally Good to Very Good condition according to the Keighery (1994) Vegetation Condition Scale adopted in *Bush Forever*, the exception being the area of wetland which has been cleared for irrigated horse agistment, which would be assigned as Multiple Use management category if accepted as a wetland.

### **Hendy Road Swamps**

The Hendy Road Swamps were damplands with assigned Resource Enhancement (eastern wetland) and Multiple Use (western wetland) management categories. They are not protected under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*.

The ground-truthing of the DoE mapping for the Hendy Road Swamps indicates that the western wetland area has been highly modified, and in practicality no longer exists. The

eastern wetland is slightly larger than originally mapped, generally extending further south.

Vegetation of the eastern wetland belongs to the Cottesloe Complex – Central & South (Hedde *et al.*, 1980), and consists predominantly of *Eucalyptus rudis* / *Melaleuca raphiophylla* woodland over *Xanthorrhoea preissii*, *Gahnia trifida*, and *Acacia saligna*.

Vegetation condition is generally Good to Very Good condition according to the Keighery (1994) Vegetation Condition Scale adopted in *Bush Forever*.

### **Long Swamp**

Long Swamp is a sumpland with an assigned Conservation management category. It is protected under the *Environmental Protection (Swan Coastal Plain Lakes) Policy 1992*.

The ground-truthing of the DoE mapping for Long Swamp indicates that the wetland area is slightly wider (east-west) than originally mapped. The area of the vegetation south of Hope Valley Road is not wetland dependent vegetation, and consists predominantly of *Acacia saligna* regrowth over shallow limestone pavement. This area may have been modified from original wetland vegetation to its current characteristics through the construction of Hope Valley Road and/or agricultural activities.

Long Swamp vegetation belongs to the Cottesloe Complex – Central & South (Hedde *et al.*, 1980), and consists predominantly of *Eucalyptus rudis* / *Melaleuca raphiophylla* woodland.

Vegetation condition is generally Good to Very Good condition according to the Keighery (1994) Vegetation Condition Scale adopted in *Bush Forever*. There is evidence of rubbish dumping and changes to boundaries through filling.



## UPLAND VEGETATION

Areas of upland vegetation between Conway Road Swamp and Hendy Road Swamps were also ground-truthed. The elevation of this area is up to 35 mAHD, some 30m or more higher than the wetland areas.

East of Conway Road Swamp and near the intersection of Anketell and Armstrong Roads (386 043 E 6435821 N), the vegetation belongs to Cottesloe Complex – Central & South (Hedde *et al.*, 1980). It is composed of *Eucalyptus marginata*, *Eucalyptus gomphocephala* / *Banksia* woodland over *Acacia* / *Macrozamia*.

Dominant species present include *Eucalyptus gomphocephala*, *Banksia sp. littoralis*, *Acacia pulchella*, *Acacia saligna*, *Xanthorrhoea preissii*, and *Macrozamia reidleyi*.

The vegetation is in Good to Very Good condition according to the Keighery (1994) Vegetation Condition Scale adopted in *Bush Forever*.

Between Armstrong Road and Hendy Road Swamps (386291 E 6435839 N), the vegetation belongs to the Cottesloe Complex – Central & South (Hedde *et al.*, 1980). It is composed of *Banksia littoralis* woodland over *Xanthorrhoea preissii* and *Macrozamia reidleyi*.

Dominant species present include *Banksia littoralis*, *Acacia pulchella*, *Acacia saligna*, *Xanthorrhoea preissii*, *Macrozamia reidleyi*, *Melaleuca sp.*, *Hibbertia sp.*, and *Hakea sp.*

Arup (2002) mapped this upland vegetation as Banksia-Jarrah woodland in Good to Very Good condition, and on the northern ridge (near the southern extent of Honor Avenue) Heath - shrubland over limestone, in Very Good to Excellent Condition (see Figure 19 of Environmental Review).

## **REVIEW OF SOUTHERN PARKS AND RECREATION BOUNDARY**

### **Outcome of Investigations**

The objective and basis of this analysis is that the Western Australian Planning Commission (WAPC) required the boundary of wetlands proposed within the Hope Valley-Wattleup Proposed Master Plan to be reviewed to ensure that current environmental values of the area are determined.

As previously noted, the P&R reserve originally proposed in the Proposed Master Plan included relatively large areas of market gardens adjacent to Abercrombie and Anketell Roads (Figure C). These areas have limited, if any, environmental value.

This assessment has determined the current edge of wetland dependent vegetation for each wetland, and annotated a 50m buffer irrespective of the management category of the wetland (Figure B).

Upland vegetation has also been considered as an important extension of the wetlands, providing vertical transition of habitat and associated values. Relatively large areas of vegetation in Good to Excellent Condition exist between Conway Road Swamp and Hendy Road Swamps, north of Anketell Road.

### **Western Australian Planning Commission's Position**

The WAPC has considered the Parks and Recreation reservation of land in the southern HVWRA and determined that at this time the core P&R area will be:

- the revised boundary of Long Swamp (i.e. the edge of wetland dependent vegetation mapped by BBG) together with a 50m buffer, with the exception of the area of land south of Hope Valley Road. Hope Valley Road is considered to form an appropriate southern management boundary in this instance;
- the revised wetland boundary of the Conway Road Swamp (i.e. the edge of wetland-dependent vegetation mapped by BBG) together with a 50m buffer, with the exception of the area of land west of Conway Road, and a southern extension to Anketell Road. Conway Road is considered to form an appropriate western management boundary in this instance; and



- An east-west linkage of upland vegetation from Conway Road Swamp east to the proposed Fremantle-Rockingham Highway road reserve.

Figure D shows the ground-truthed and revised boundary of Long Swamp and Conway Road Swamp and the extent of the 50m buffers, and the east-west upland linkage, which will form the basis of the WAPC's P&R reserve.

### **Identification of Potential Conservation Areas for Consideration in Future Structure Planning**

All areas of vegetation surveyed are from the Cottesloe Complex – Central & South (Heddle *et al.*, 1980), with approximately 36% of the original area remaining in the Perth Metropolitan Area, and approximately 18% is proposed for reservation through the implementation of Perth's *Bush Forever*. The *Bush Forever* target is 10% of each complex, and consequently Cottesloe Complex – Central & South may be considered adequately reserved.

Nonetheless, the opportunity to reserve wetlands and relatively large uplands area in good condition, with both north-south and east-west linkages, may be considered to occur relatively infrequently.

Figure D defines other areas identified as having potential conservation value for consideration in future structure planning in the south of the HVWRA, based on the outcomes of the current investigations.

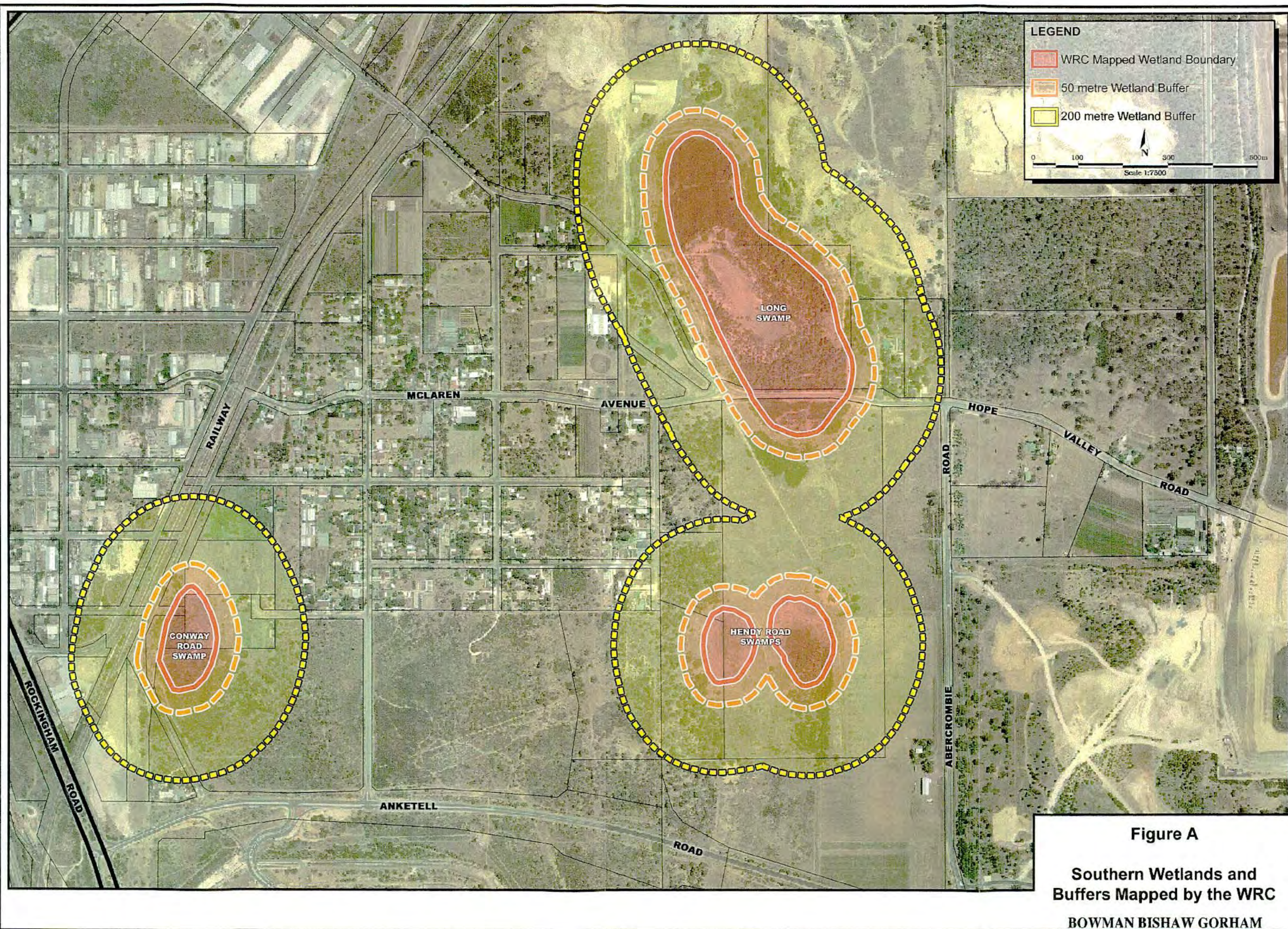
These areas include:

- The largely vegetated north-south linkage from Long Swamp to the Hendy Road Swamps;
- All of the remaining eastern Hendy Road Swamps and an associated 50m buffer, together with the majority of the highly modified western "wetland"; and
- The part of the vegetated east-west linkage from Hendy Road Swamps to Conway Road Swamp not currently supported by the WAPC for reservation, which encompasses a large area of upland vegetation in Good to Excellent Condition with good boundary to area ratio (it is noted that this linkage may

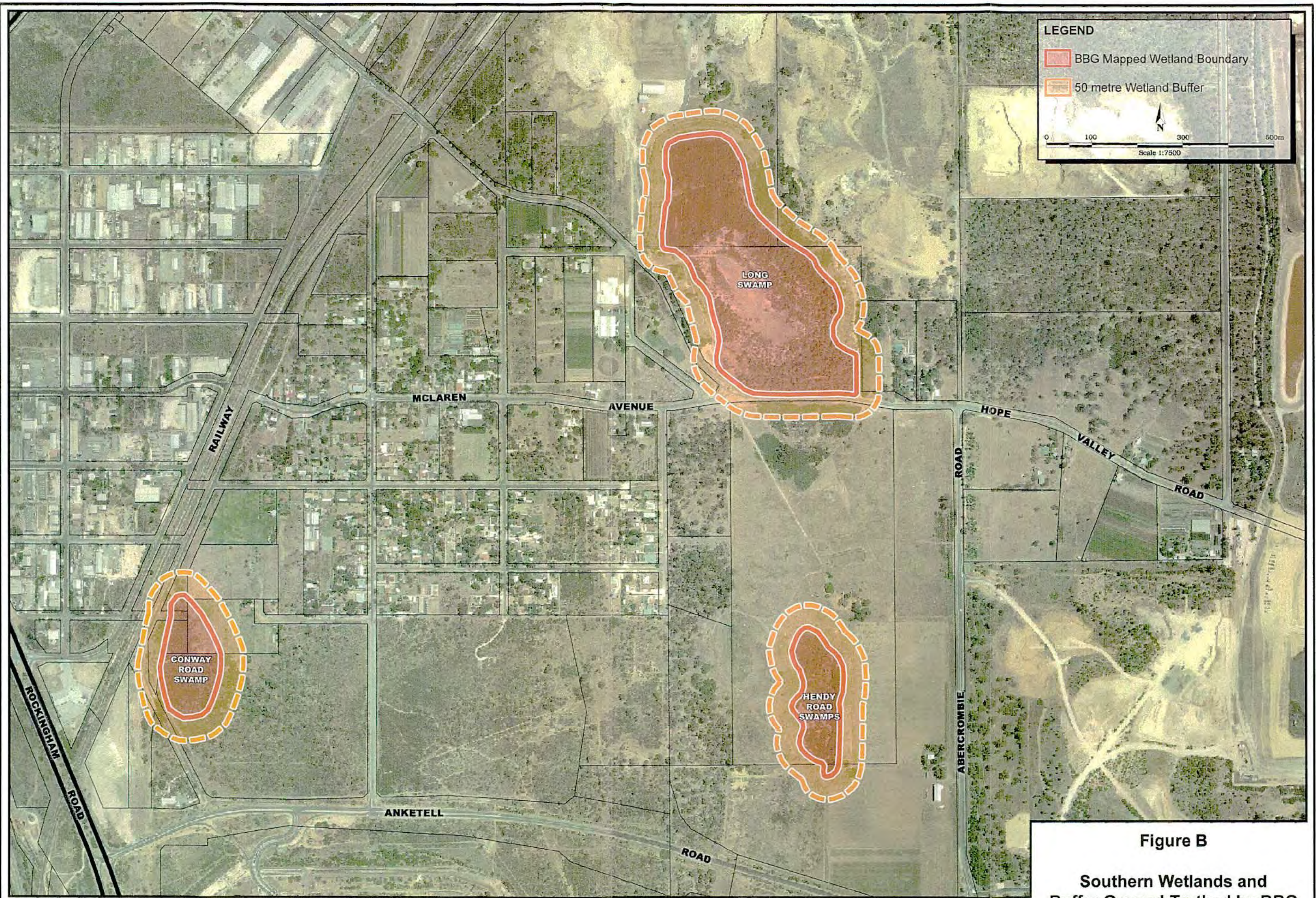
eventually be bisected through the construction of the Fremantle-Rockingham Highway).

It is noteworthy that the adoption of a future structure plan for each precinct must be with the agreement and approval of the regulatory authorities, and consequently there is opportunity for further consideration and negotiation in these matters.







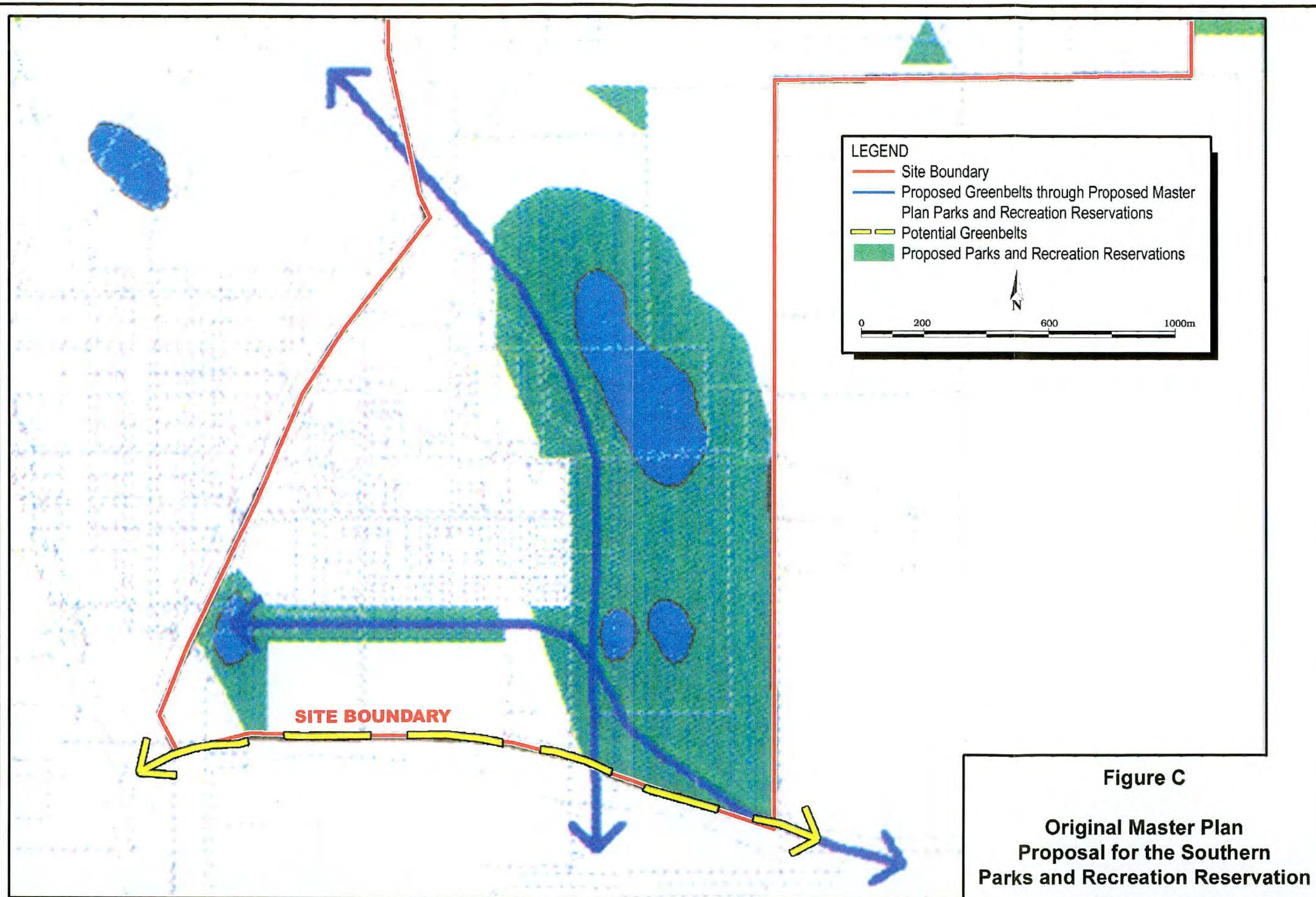


**Figure B**

**Southern Wetlands and  
Buffer Ground-Truthed by BBG**

**BOWMAN BISHAW GORHAM**  
ENVIRONMENTAL MANAGEMENT CONSULTANTS







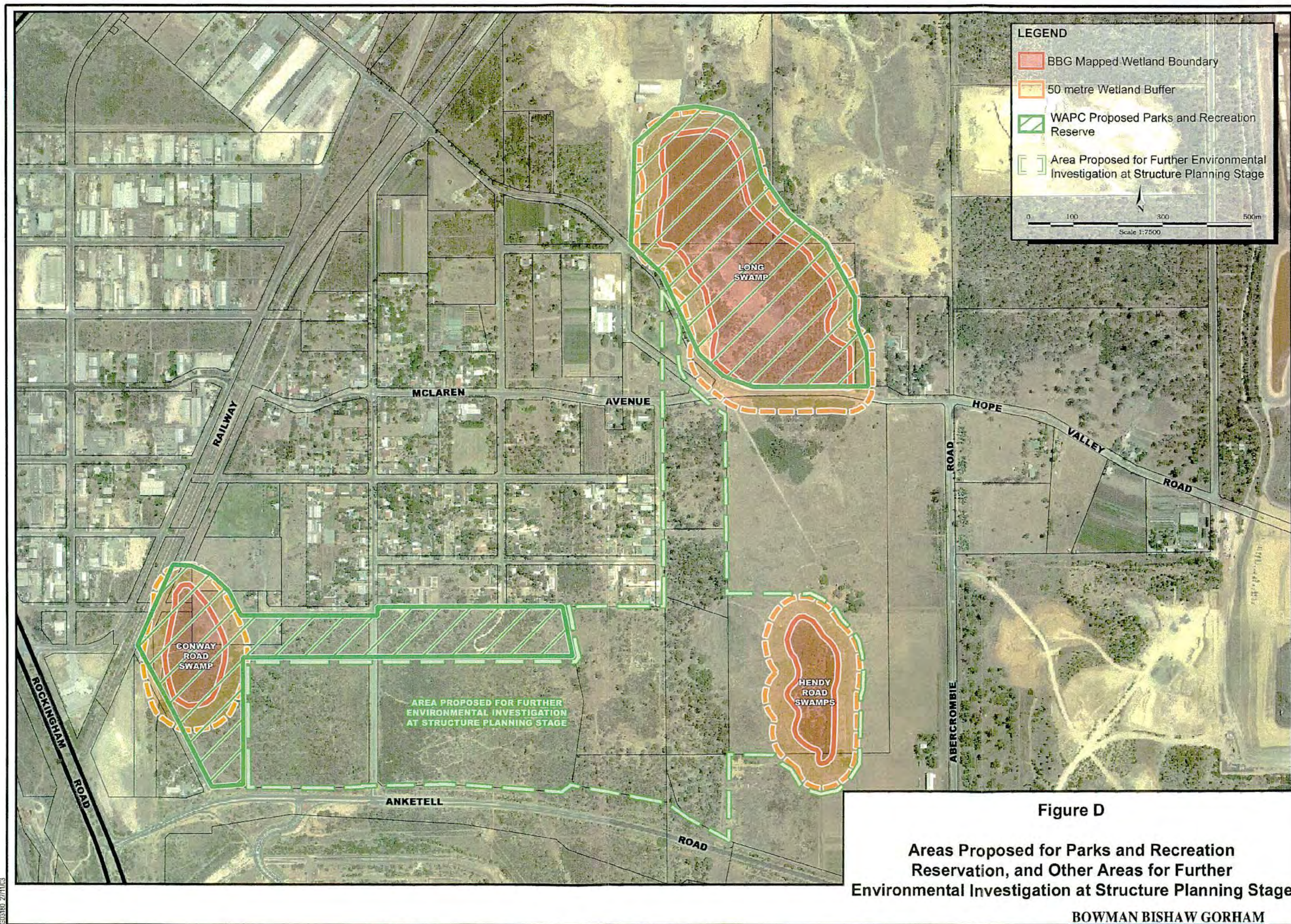


Figure D

Areas Proposed for Parks and Recreation Reservation, and Other Areas for Further Environmental Investigation at Structure Planning Stage