Oxleigh Holdings Pty Ltd

Landsdale Urban Development

Proposal to Amend Part of 'M8: System 6' Boundary

Consultative Environmental Review

Ove Arup & Partners
Consulting Engineers

Oxleigh Holdings Pty Ltd

An Environmental Assessment of Lot 2, Snake Swamp Landsdale, to Propose and Justify the Amendment of the System 6 Boundary (Part of M8).

Consultative Environmental Review

November, 1993

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INVITATION

The Environmental Protection Authority (EPA) invites people to make a submission on this proposal.

The Consultative Environmental Review (CER) proposes the amendment of part of the M8: System 6 boundary at Landsdale. In accordance with the Environmental Protection Act, a CER has been prepared which describes this proposal and its likely effects on the environment. The CER is available for a public review period of 4 weeks from 22 November 1993 closing on 28 December 1993.

Following receipt of comments from government agencies and the public, the EPA will prepare an assessment report with recommendation to the government, taking into account issues raised in public submissions.

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 suggestion you have to improve the proposal.

All submissions received by the EPA will be acknowledged. Submissions may be fully or partially utilised in compiling a summary of the issues raised, or, where complex or technical issues are raised; a confidential copy of the submission (or part thereof) may be sent to the proponent. The summary of issues raised is normally included in the EPA's assessment report. Submittors would not be identified to the proponent without the submittor's permission.

Why not join a group?

If you prefer not to write your own comments, it may be worthwhile joining with a group or other groups 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.

Developing a submission

You may agree or disagree with, or comment on, the general issues discussed in the CER, 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 environmentally more acceptable.

When making comments on specific proposals in the CER:

- 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 CER;
- if you discuss different sections of the CER, 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.

The closing date for submission is: 28 December 1993.

Submissions should be addressed to:

The Environmental Protection Authority
Westralia Square
141 St George's Tce
PERTH WA 6000

Attention: Ian Harvey

CONTENTS

FIGURES

APPENDICES

ABBREVIATIONS AND GLOSSARY

Australian Height Datum	AHD
Coffee rock	iron cemented sands, occurs at about water level.
Consanguineous wetlands	distinctly related because of similarity in size, shape, soils, water, setting and origin.
Consultative Environmental Review	CER
Conservation	embraces preservation, maintenance, sustainable utilisation, restoration, and enhancement of the natural environment.
Dampland	seasonally waterlogged basin of variable size and shape.
Department of Planning and Urban Development	DPUD
Environment	means living things, their physical, biological and social surroundings, and the interactions between all these (Environmental Protection Act, 1986).
Environmental Protection Authority	EPA
Environmental Protection Policy	EPP
Environmental Review and Management Plan	ERMP
Groundwater	sub surface water in the zone of saturation.
hectare	ha
Metropolitan Regional Planning Authority	MRPA
Metropolitan Region Scheme	MRS
Parks and Recreation (reserve)	P&R
Public Open Space	POS
Structure plan	A concept plan showing land zonings, submitted to DPUD for approval at the MRS amendment stage
Sumpland	seasonally inundated basin of variable size and shape.
Waterlogged	an area in which water stands near or at the land surface.
Wanneroo City Council	WCC
Water Authority of Western Australia	WAWA
Wetland	an area of permanent, seasonal or intermittent inundation, whether natural or otherwise: fresh, brackish, saline; static or flowing.

SUMMARY

Background

A Structure plan for the Landsdale subdivision was submitted to the EPA and approved with informal assessment in 1991. This included an area owned by Oxleigh Holdings Pty Ltd - Lot 2. This Lot has a System 6 area over about 40% of the total land area. This System 6 area is known as the M8 wetlands. However one wetland of the M8 chain known as "Snake Swamp" covers part of Lot 2 and other adjoining land not in Oxleigh Holdings' ownership.

The System 6 area is contained within a central Public Open Space provision spanning at least two separate land owners' land, significantly North Whitfords Estates to the south.

Objectives of the Consultative Environmental Review

The Consultative Environmental Review (CER) should have the following objectives[1]:

- to place this project in the context of the planning process and progressive development of the locality affected by System Six Recommendation M8 for Snake Swamp;
- to explain the issues and decisions which led to the choice of this project at this place at this time;
- to set out the environmental impacts that the project may have; and,
- for each impact, to describe any environmental management steps the proponent believes would avoid, mitigate or ameliorate that impact.

The CER should focus on the major issues for the area and anticipate the questions that members of the public will raise. Data describing the environment should be directly related to the discussion of the potential impacts of the proposal. Both should then relate directly to the actions proposed to manage those impacts.

Justification for Proposed Change

It can be shown that:

- "Snake Swamp" has few wetland attributes, and is not covered by the EPA Lakes Policy;
- without excavation to groundwater it would be improbable that wetland functions would return as a result of natural events; and,
- the decrease in size of the POS cell is justified on the basis of increased function as a result of physical intervention and rehabilitation of the area by the landowners.

On this basis it is considered that the change in the System 6 boundary is justified and should be approved by the EPA, thus allowing urban development over the balance. In return the land owners would develop a wetland in accordance with accepted concepts of wetland rehabilitation and development.

[1] *Letter from EPA dated 6 September 1993*

1. INTRODUCTION

1.1 Background

The Project area is located near the corner of Alexander Drive and Gnangara Road Landsdale Western Australia. The urban development area has within it a System 6 area (the "area"). This area and the general environs around it are shown in Figure 3. The area is referred to as "Snake Swamp" in the System 6 report and this will be consistently adopted in this report, although there is little to identify the area now as a swamp. Currently the area is in private ownership and is used for little other than as an ad hoc rubbish dump.

The part of this area that is owned by Oxleigh Holdings Pty Ltd is Lot 2, south of Gnangara Lake, as indicated in Figure 1 and will be referred to as "Lot 2".

It is the intention of Oxleigh Holdings Pty Ltd to develop part of Lot 2 for urban development in accordance with the original Structure plan. This report is intended to show cause why the System 6 area boundary should be realigned and reduced to provide for an increased area of urban development within Lot 2. As a result a number of tradeoffs would also be provided for. These are detailed in this report.

No consultation was carried out with the other current land owners affected by the System 6 area in the preparation of this report (ie Lot 4 and 5).

1.2 Timing

The development of the Snake Swamp POS cell would be in accordance with a development front which has begun at the end of Queensway by North Whitfords Estates. This development front is expected to move initially to the south around the village centre and move north. Current market trends suggest that Snake Swamp POS cell would have to be developed for aesthetic and drainage requirements some two years hence (estimate only).

Oxleigh Holdings Pty Ltd would probably not develop their POS until this development front was in a position to supplement the development of Lot 2. This is essentially at the 'mercy' of market forces. However Oxleigh Holdings Pty Ltd would commit to developing their POS in consultation with North Whitfords Estates at the time it is required for normal POS development.

1.3 Zoning

Oxleigh Holdings Pty Ltd seek to obtain POS credit for the entire area of POS from the Local Government Authority.

1.4 Requirements of the Environmental Protection Act 1986

The proponent has been advised by the EPA[2] that referral under Section 38(1) of the Environmental Protection Act 1986 would be required because of the System 6 boundary being where it is. This Consultative Environmental Review (CER) has been compiled on the basis of advice from the EPA on content. EPA Guidelines are included as Appendix A.

It is maintained that the (adverse) environmental impacts caused by this proposed realignment of the System 6 boundary are not significant, in fact they would be positive as detailed in Section 5, below.

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[2] *Pers. comm. Mr Gary Middle.*

It is recognised that 'technically' the existence of the System 6 area, and a proposal to amend the boundary, would normally necessitate a referral under Section 38(1) irrespective of the 'environmental impact' referred to in that Section.

1.5 Restrictions on Use of This Report

This report is prepared for the use of Oxleigh Holdings Pty Ltd. It has been prepared in connection with their wish to establish and justify a realigned System 6 boundary within Lot 2. The recommendations of this Report are for the realignment of this boundary and the associated tradeoffs. The Report takes into account particular instructions and requirements of the Client. It is not intended for, and should not be relied upon by, any third party. No responsibility is undertaken to any third party.

2. RELEVANT REPORTS AND POLICES RELATING TO 'SNAKE SWAMP'

2.1 System 6

2.1.1 'Red Book' Recommendations

In 1980, the findings of a four-year study of the Darling System by the System 6 Committee were presented to the EPA. The overall aim of the study was to identify natural features within the Darling System that should be set aside for National Parks, nature reserves and major associated recreational areas, under the Land Act 1933-1977. Consideration was also given to those areas where planning and management should allow and/or encourage protection of conservation values and increase public access to and enjoyment of them.

In 1983 the Department of Conservation and Environment (now the EPA) published the System 6 Red Book[1] (relevant excerpt attached as Appendix B). A map showing part of this chain is provided in Figure 3. Within the report, Snake Swamp is described as "... the largest of several seasonal swamps and winter-wet depressions ... The area has been intensively grazed, and the surrounding woodland is very disturbed. If permanent water is maintained by pumping or deepening, the swamp could contribute to the landscape of a recreational area." This book recommended that:

- recommendations on planning and management of Regional parks be applied (attached as Appendix C);
- the MRPA (now the Department of Planning and Urban Development (DPUD)) consider reserving under the Metropolitan Region Scheme (MRS) these wetlands in a priority order - the area in question being ninth in a list of thirteen; and,
- the Circular Lakes Landscape Enhancement Area Plan[3] be endorsed.

2.1.2 Implementation of System 6 Recommendations

It is suggested that the function of the System 6 report is to provide 'regional conservation and recreation' recommendations for particular areas. In addition the **intent** of these recommendations are the basis of 'EPA policy' on such matters (ie the EPA seeks to implement the **intent** of the recommendations, wherever possible and practical).

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[3] *This Plan was never written down, endorsed nor applied by the Wanneroo City Council (pers comm Ms Louise Koroveshi, Assistant Planner WCC).*

2.2 Gnangara Mound Groundwater Resources ERMP

An Environmental Review and Management Program for the Gnangara Groundwater resources was prepared in 1986[2]. This study classified Snake Swamp as part of a shallow lake system. This was shown in a figure in the report as a 'Seasonal Swamp' which featured depressions with free water in winter, humus podzols and peats, dense *Melaleuca preissiana, M. rhaphiophylla* and *Eucalyptus rudis* around the fringe with reeds and sedges in the centre. See Figure 5.

This report also specified that under the preferred option, approved by the EPA, that the effect on Snake Swamp would be "positive" (ie a rise in the groundwater level of greater than 0.5m)[4].

2.3 EPA Bulletin 295[3], August 1987

This Bulletin was the report and recommendations of the EPA on the Gnangara Mound ERMP[2]. This Bulletin stated that Snake Swamp had few remaining natural attributes and limited human use attributes as defined by the EPA's draft guidelines for Wetland Conservation in the Perth Metropolitan Region[4]. It also states that there would be no change in the groundwater level at this locality and that the EPA agrees with the recommendations of the ERMP (Table 6.1).

In that Bulletin there appears to be some difference between what the Gnangara Mound ERMP stated as the effect on Snake Swamp and that in the ERMP (no change versus 0.5m rise, respectively). The EPA goes on to recommend (ie Recommendation 3) that the Water Authority manage public and private groundwater abstraction such that the drawdown does not have an impact greater than that specified by the EPA in this report (ie Bulletin 295 - no change to groundwater levels).

2.4 EPA's Lake and Wetland Policies

The conservation value of wetlands is related to many factors including their form, function and human use. These attributes can be determined in a consistent way and management objectives defined for categories of wetlands. It is clear that the community of Western Australia has endorsed the EPA's Environmental Protection Policy[5] (EPP) and supports it for the conservation of lakes on the Swan Coastal Plain.

The EPP was released in April 1992 as a 'Lakes Policy' and included a revised schedule of lake areas. Snake Swamp was not protected by the EPP. Snake Swamp and other wetlands, sumplands and damplands, were therefore anticipated by EPA to be evaluated by proponents and government agencies according to Bulletin 686[10].

The following section describes the evaluation.

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[4] *Table 24 and Figure 50.*

2.5 Murdoch University Report

A study of wetlands within the City of Wanneroo was initiated by the Water Authority of Western Australia (WAWA) and the City of Wanneroo in 1990. This was conducted by students at Murdoch University and resulted in the formulation of a "Draft Management Proposal for Wetlands in the City of Wanneroo"[6].

Recommendations for management were made on the basis of individual assessments of each wetland. Wetlands were identified, classified and evaluated according to Semeniuk's Classification System[7] and the EPA Bulletin No 374[8] (A precursor to Bulletin 686). Both natural and human use attributes were considered.

Wetland "126" was classified as a "dampland" and included within the 'Resource Enhancement' Management Category. A 'Resource Enhancement' wetland is considered to be one where modification has occurred, but the wetland does not have a clearly recognised human use in its setting. The EPA management objectives for 'Resource enhancement' wetlands are to maintain and enhance the existing ecological functions.

2.6 Summary

The following table lists the policies and issues relevant to Snake Swamp:

Date	Report	Recommendation	Comment
1983	System 6 Red Book	• Recommendations on planning and management of Regional parks be applied • MRPA reserve land for P&R, giving Snake Swamp a low priority • WCC's circular lakes enhancement policy be adopted	Pumping of water could assist in enhancing Snake Swamp
1986/ 1987	ERMP/EPA Bulletin 295	• EPA approval to scheme with no alteration to Snake Swamps water level	Difference in levels between ERMP and EPA Bulletin
1991	Murdoch University Report	R category wetland assessment	At a time when groundwater levels were well below current levels and when seasonal waterlogging was probably absent
1992	EPA's Lakes EPP	Area not gazetted for protection as a lake	Not protected under Part 3 of EP Act

Table 1: Summary of Policies and Reports Relating to Snake Swamp

3. EXISTING ENVIRONMENT

3.1 Land Ownership

The ownership of the land in question is shown in Figure 1.

3.2 Landform/Topography

'Snake Swamp' is a low point in the general landform of the area. The existing ground contours are shown in Figure 2, together with a Concept Development Plan for lots 2 and 4. Gentle slopes are evident around the depression with the greatest slope to the west at about 1:10 (maximum).

3.3 Land Use

The area is used for little other than as an infrequent, ad hoc rubbish dump. The area and its surrounds are littered with dumped car bodies, domestic and industrial solid waste. There is evidence of saw dust being dumped in the area some time ago over much of the lowest point (hand auger holes have brought up what appears to be saw dust over the area). The area was reticulated for marketing gardening. The pipework still remains.

3.4 Flora and Fauna

Several studies have examined the vegetation of the general region. Comprehensive surveys of flora were undertaken for the Gnangara Mound Groundwater Resources Environmental Review and Management Program in 1986[2]. The vegetation of the area is largely determined by the landform, soil, climatic conditions, depth to groundwater and human activities. It has also been suggested by Arnold[9] that the groundwater contours of seasonal wetlands can be determined by the boundary between banksia woodland and paperbark-wetland heath and sedgelands. This boundary appears to be coincident with the 43m AHD contour, in keeping with the historic long term groundwater level.

Remnants of native vegetation, in highly degraded forms, exist above the 42.5m AHD contour.

Dominant species over the whole area bounded by Alexander Drive in the east, Gnangara Road in the north, the extension of Madeley Street in the west and Kingsway to the south are as follows. (Note that these are not generally represented below the 42.5m - 43m AHD contour):

Dominant Woodland Species	
Genus and Species	**Common Name**
Banksia attenuata	
Banksia menziesii	Firewood Banksia
Banksia ilicifolia	
Casuarina fraseriana	Swamp Sheoak
Eucalyptus marginata	Jarrah
Eucalyptus calopylla	Marri
Eucalyptus rudis	Flooded Gum
Macrozamia riedlei	Zamia Palm
Melaleuca rhaphiophylla	Paper Bark
Nuytsia floribunda	WA Christmas Tree
Xanthorrhoea preissii	Black Boy
Shrub and Ground Species	
Genus and Species	**Common Name**
Acacia pulchella	Prickly Moses
Acacia divergens	
Burchardia multiflora	
Burchardia umbellata	
Calyrix amethystina	
Conospernum stoechadis	Smoke Bush
Gompholobium tomentosum	
Grevillea synapheae	
Hibbertia hypericoides	
Jacksonia sternbergiana	
Loxocarya flexuosa	
Lepidosperma spp	
Mesomelaena tetragona	
Pimelea leucantha	
Regelia ciliata	
Scholtzia involuctrata	
Verticordia nitens	

Table 2: Dominant Plant Species Above the 43m AHD Contour

Some small clumps of *Melaleuca preissiana* are present near the 43m AHD contour.

Generally the vegetation of the region is in very poor condition.

Significantly the area below the 42.5m AHD contour is dominated by thick and impregnable stands, to 3m high, of Pampas grass (*Cortaderia selloana/jubata*).

3.5 Soils and Hydrology

The soils of the area are grey Bassendean soils. It is interesting to note that recent excavations by consultants revealed two layers of 'early coffee rock' between 1 metre and 2 metres depth (indicating that the groundwater level had been at these two distinct levels for some time) @ 39m and 40m AHD contour.

The Water Authority has for some years been extracting groundwater for Perth's scheme water supply. This has affected the groundwater level in the region significantly. This abstraction program has been the subject of an ERMP in which a number of schemes were put forward[2]. Groundwater levels as detailed in this ERMP showed a decline in this area of about 1m over the period 1976 to 1985. This has subsequently declined by about 0.5 to 1 metre, based on observation and groundwater monitoring bore hydrographs.

This reduction in groundwater level is highly significant when contact with the 'hydric soils' would mean the difference between being able to support wetland vegetation and not. In addition the viability of the wetland is directly related to the depth to water level, especially when this wetland is seasonally inundated (viz being mainly dry in Summer).

Importantly the long term water level for the wetland is critical to define in order that an average water level can be accurately established. This can be estimated from interpolation from Water Authority groundwater contours and nearby bore hydrographs. The wetland mapping system as devised by Semeniuk[7], recognises that Perth is in an extended period of below-average rainfall. Wetland water levels will rise when the rainfall returns to a sequence of 'average' years, although this Winter and Spring (1992) have been the wettest in 11 years[5].

3.6 Current Function and Form

Snake swamp is dry all year round and covered with Pampas grass. There is no wetland vegetation other than small isolated clumps of Melaleuca with very little if any understorey. Weeds proliferate (Veldt grass and African Love grass, pig face, etc). Its function would not differ significantly from the degraded area surrounding it nearby.

It is therefore considered almost unwarranted to discuss the function of the low lying area as that of a wetland as it has no attributes that distinguish it from the surrounding area other than the occurrence of Pampas grass and the total lack of native flora species. Its function however is detailed as follows:

- **flora** - no intact native wetland flora associations (ie with undisturbed understorey);
- **fauna** - no wetland fauna habitats present;
- **scientific** - little likelihood of any scientific interest; and,
- **education** - again, little likelihood of any educational resource at this location other than to show what happens to a dampland denied of its contact with groundwater.

This proposal will improve form and function over and above that which currently exists.

[5] *Pers. comm., Bureau of Meteorology.*

4. PLANNING BACKGROUND

4.1 Background

The extension of urban development east of Wanneroo Road was first identified in the Corridor Plan Review (1987) and consolidated in the City of Wanneroo Draft Rural Strategy (1988), and the METROPLAN released in 1990.

The Urban Expansion Policy of 1990 specifically identified Landsdale as a category A1, that is "*.... land assessed as having no constraints to urban development in the short term, generally within five to ten years*".

4.2 Current Structure Plan for Landsdale

A formal referral to the EPA of a Structure plan for the area was sent to the EPA in accordance with Section 38 of the Environmental Protection Act on September 23, 1991 by Feilman Planning Consultants on behalf of North Whitfords Estates. This Structure plan extract is attached as Figure 4.

The EPA set an informal level of assessment on October 9, 1991. No appeals were lodged as of October 25, 1991 - the end of the period in which appeals could be lodged.

The Structure plan included an area of Public Open Space that loosely conformed to the boundary of the System 6 area. The EPA, in a letter to Arup on May 29, 1992 stated that:

"*.... the area set aside for public open space shown in the structure plan was acceptable as it included all of the System 6 land associated with Snake Swamp.*" (paragraph 3)

Taken in context this appears to support the notion that the area set aside for POS is in keeping with the general area of the System 6 area. There has never been any dispute that the current area set aside for POS did not include all of the System 6 area.

5. SYNTHESIS AND CONCLUSIONS

5.1 Actions Leading to the Degradation of 'Snake Swamp'

Damplands (i.e. seasonally waterlogged) are extremely susceptible to changes in groundwater level. With the reduction in groundwater level as a result of some or all of the following:

- an overall decrease in rain over an extended period;
- extensive pine planting in the local catchment;
- increased extraction of groundwater by the Water Authority; and,
- the land use to which the site historically has been put,

the 'dampland' has been severely degraded. This degradation has occurred to the point where it is very difficult to justify the existence of a 'wetland' per sei at "Snake Swamp". Given current groundwater levels being the highest in many years (above average) the highest groundwater level is still well below that of the base of the hydric soils (ie at its highest @ 41m AHD). Therefore waterlogging or inundation is almost impossible.

5.1.1 Future conditions

It is not possible to predict the future groundwater regime with any certainty. A general return to normal of the average rainfall together with the proposed thinning of the pipe plantation would raise groundwater, while increased groundwater pumping by the Water Authority would lower it.

However it seems likely that the Mirrabooka field will extract groundwater to the extent that water levels in Gnangara Lake are maintained - the higher the groundwater level and the correspondingly potential higher level in Lake Gnangara the more groundwater can be extracted, and vice versa). It is unlikely that in the long term that this groundwater level will rise significantly above its current level, unless:

- the importance of the Mirrabooka field groundwater resource declines; or,
- a higher water level in Gnangara Lake is acceptable; or,
- consequent flooding and drainage problems can be overcome.

These are highly unlikely.

5.2 Proposed Changes to Boundary

It is proposed to realign the boundary of the Public Open Space Area as shown in Figure 6. This will mean that areas in the Structure plan would be affected as follows:

Area	Original Structure plan	With proposed boundary[6]	Change
System 6/POS	4.12ha	2.54ha	48% reduction
Lot 2: Developable	6.39ha	7.96ha	21% increase
Percentage POS	64%	32%	na

Table 3: Comparison of Areas

[6] *As per Figure 6.*

This reduction of area is planned to ensure that the appropriate amount of POS is provided for as a result of increased urban development. It should be noted that the minimum requirement under planning regulations is 10%. However in this case over 30% of the developable land is being ceded as POS. In other words, the POS cell as it is, provides for more than 60% of developable land to be ceded as POS. But with the proposed change to the boundary the total area of POS still exceeds the statutory requirements for POS by more than 300%.

5.3 Proposed Enhancement of the Area

It is proposed to develop the Snake Swamp POS cell as part of the Landsdale urban development. The redevelopment costs associated with the POS will be shared on a pro-rata basis by the contributing landowners. The land owners being North Whitfords Estates and Oxleigh Holdings. The timing of the development would be in keeping with the general marketing requirements for the subdivision (i.e. the POS cell would be developed some time in advance of the time when blocks would be first placed on the market[7]).

5.3.1 Development Plan

The indicative development plan is shown in Figure 6. It was developed in this form so that both land owners had the potential to develop their land in isolation and independently in time, as well as take account of any potential reduction in size of the POS cell. Figure 6 shows two independent 'lakes' and associated POS areas. The latter (in time) development would, if required, establish the internal island with a minimum of disruption by breaking through the separating paths. The lake area and associated dry landscaped basins are considered appropriate for drainage purposes, although there would not be any direct drainage of stormwater into the lakes.

5.3.2 Lake Detail

It is proposed that the internal detail of the lakes (eg cross section and bottom contour, habitats, etc) and the associated features of the area would be developed in accordance with the following concepts:

- design to incorporate integrated compensating and aquifer recharge function in accordance with no direct drainage of stormwater into the lake;
- increased attractiveness for passive recreation, education, encourage the establishment of wildlife and native wetland vegetation;
- assimilation of nutrients in stormwater, trapping of sediments and other pollution likely to be in stormwater external to the lake in dry landscaped basins;
- the establishment of diverse food web (eg varied habitats including island refuge, open water, reed beds, seasonally or storm event inundated areas, etc); and,
- permanent water affording drought refuge and summer habitat for water birds and trans-equatorial migratory species.

It is clear that this lake, as an expression of the water table, would be an index of environmental quality, particularly water level changes.

In the amended planning for the area a proposal for Public Open Space would be put forward to DPUD and to the City of Wanneroo. The lake would be surrounded by a buffer of POS no smaller than 50m.

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[7] *This is typically also a requirement of Council.*

Planting and rehabilitation in the area would be in keeping with that specified in concept in Figure 6. The proposed species would be local indigenous wetland varieties. Specific landscape detail would be developed in consultation with the Wanneroo City Council Parks and Gardens Department.

5.3.3 Management Category

In accordance with the principles of Wetland Management Categories[4] it is proposed to develop the concepts, design detail, landscaping plans, recreation zoning and internal land uses consistent with a Category "O" (Open Space) wetland. The management objective of this category is to provide for human uses whilst maintaining and enhancing the existing natural attributes.

It is considered that the management categories were developed for existing wetlands, whilst what is proposed is to create a wetland where one does not currently exist.

Nobody can predict with precision what may happen in the future. And to commit to developing a wetland from nothing to a specific category would be perilous because of the number of uncontrolled variables. However it is the vision of Oxleigh Holdings that this area be developed in accordance with the concepts of the Open Space Management objective. But this is not something that forms the basis of a commitment, nor is it expected that performance would be measured against this objective.

5.4 Reduction in Size Versus Increase in Function

The proposal to move the POS boundary to the south was discussed with the EPA. It was suggested that to justify this change, the proponent must define the current function of Snake Swamp and specify the 'tradeoffs' that would result from enhanced wetland function. An approval to decrease the size of the System 6 area in the Structure plan would then be considered.

It is recognised that the justification for a changed boundary to, and reduced area of the System 6 area at Landsdale would be for increased wetland function. Given that the existing function as a 'wetland' is almost non-existent, it is considered that the provision of a wetland where one does not exist obviously improves the function. **This is the key argument for this proposal.**

5.5 Consistency with the Intent of System 6 Recommendations

It is considered that the recommendations for System 6 had the intent for the M8 wetlands that they be acquired or reserved in priority of conservation value and placed within a Regional Park and managed accordingly. Snake Swamp was low on the priority list and in fact it seems that the EPA and DPUD agree that there is no reason that this should in fact occur[8].

Enhancement of the area was considered to be accomplished by pumping water from the groundwater to the surface and into the swamp. given that the groundwater level is significantly depressed, then this would be impractical. However the provision of permanent water can be accomplished by deepening and allowing the groundwater to express its own level at the surface.

It is therefore concluded that the intent of the System 6 recommendations for M8 are being complied with and that the suggestions of the text of the Red Book are also being adhered to in 'spirit'.

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[8] *EPA correspondence stating that they are happy for the area to be used as POS as in Section 4.2, above.*

5.6 Conclusion

It is concluded that the proposed review of the System 6/POS boundary should be approved on the basis of:

- **changes made to the groundwater level,** one of the causes of the Snake Swamp degradation, were compounded by Government (WAWA) approved groundwater extraction (ie destruction of the System 6 wetland was considered insignificant);
- **improved function of the Snake Swamp** - no wetland exists where one is proposed to be developed - a degraded site will be upgraded into a quality resource; and,
- **any alternative is counterproductive** - the site will continue to stagnate.

6. COMMITMENTS

6.1 Conditions

Oxleigh Holdings Pty Ltd would develop the Snake Swamp POS area, within reason, in accordance with the development plan and conceptual planting and habitat plan (Figure 6) on their land. The development plan is **in principle only**, within which other options may be explored.

In implementing the development plan, it should be noted that:

- these plans are conceptual and may be modified as a result of other surrounding land owner's requirements. Therefore it is premature to provide detailed information, before approval to the 'concept' of boundary realignment is agreed to;
- the plans are indicative of areas, zones and boundaries like any other Structure Plan. If for example the average groundwater level at the time of development was different to what it is now, this would effect the development plan (i.e depth of the lake, level of the shoreline, etc). These issues are best considered closer to the time of development and appropriate designs and plans developed then;
- the general concepts and principles referred to in this document would be followed as closely as possible. Advice from the relevant authorities would be sought. If there was a need to propose a major change to the principles then this would be taken up with the EPA for consideration in accordance with the intent of Section 46(6) of the Environmental Protection Act; and,
- it is the intention of Oxleigh Holdings to liaise with North Whitfords Estates in the development of this cell as an integrated cell of POS.

6.2 Lake Design Detail

Upon the proponent proceeding with the urban development of Lot 2, the lakes and the associated features of the area would be developed in accordance with the following concepts:

- there would not be any direct drainage of stormwater into the lakes;
- design to incorporate integrated compensating and aquifer recharge function in accordance with no direct drainage of stormwater into the lake;
- increased attractiveness for passive recreation, education, encourage the establishment of wildlife and native wetland vegetation;
- assimilation of nutrients in stormwater, trapping of sediments and other pollution likely to be in stormwater external to the lake in dry landscaped basins;
- the establishment of diverse food web (eg varied habitats including island refuge, open water, reed beds, seasonally or storm event inundated areas, etc);
- wherever possible relevant, local, indigenous species would be used for planting in the cell;
- permanent water affording drought refuge and summer habitat for water birds and trans-equatorial migratory species;
- the lake would be surrounded by a buffer of POS no smaller than 50m; and,
- the concepts, design detail, landscaping plans, recreation zoning and internal land uses consistent with a Category "O" (Open Space) wetland.

6.3 Water Quality Monitoring

Appropriate monitoring of the water quality would be undertaken and submitted to the Wanneroo City Council. Data to be collected would include;

- water levels;
- pH;
- conductivity;
- total Nitrogen;
- total Phosphorous;
- chlorophyll a.

The frequency of water quality testing is expected to be quarterly initially and then twice annually.

REFERENCES

1 Department of Conservation an Environment. Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority - 1983. The Darling System - System 6, Part II: Recommendations for specific locations, Report No 13. October 1983.

2 Water Authority of Western Australia. Gnangara Mound Groundwater resources ERMP by Dames & Moore. November 1986.

3 EPA Bulletin 295, August 1987. Gnangara Mound Groundwater Resources, Report and Recommendations fo the Environmental Protection Authority.

4 Environmental Protection Authority Bulletin 227. Draft Guidelines for the Conservation of Wetlands in the Perth Metropolitan Area. December 1986.

5 Environmental Protection Authority. Environmental Protection (Swan Coastal Plain Lakes) Policy 1992. December 1992.

6 Environmental Science students of N319, Murdoch University. Draft Management Proposal for wetlands in the City of Wanneroo. 1991.

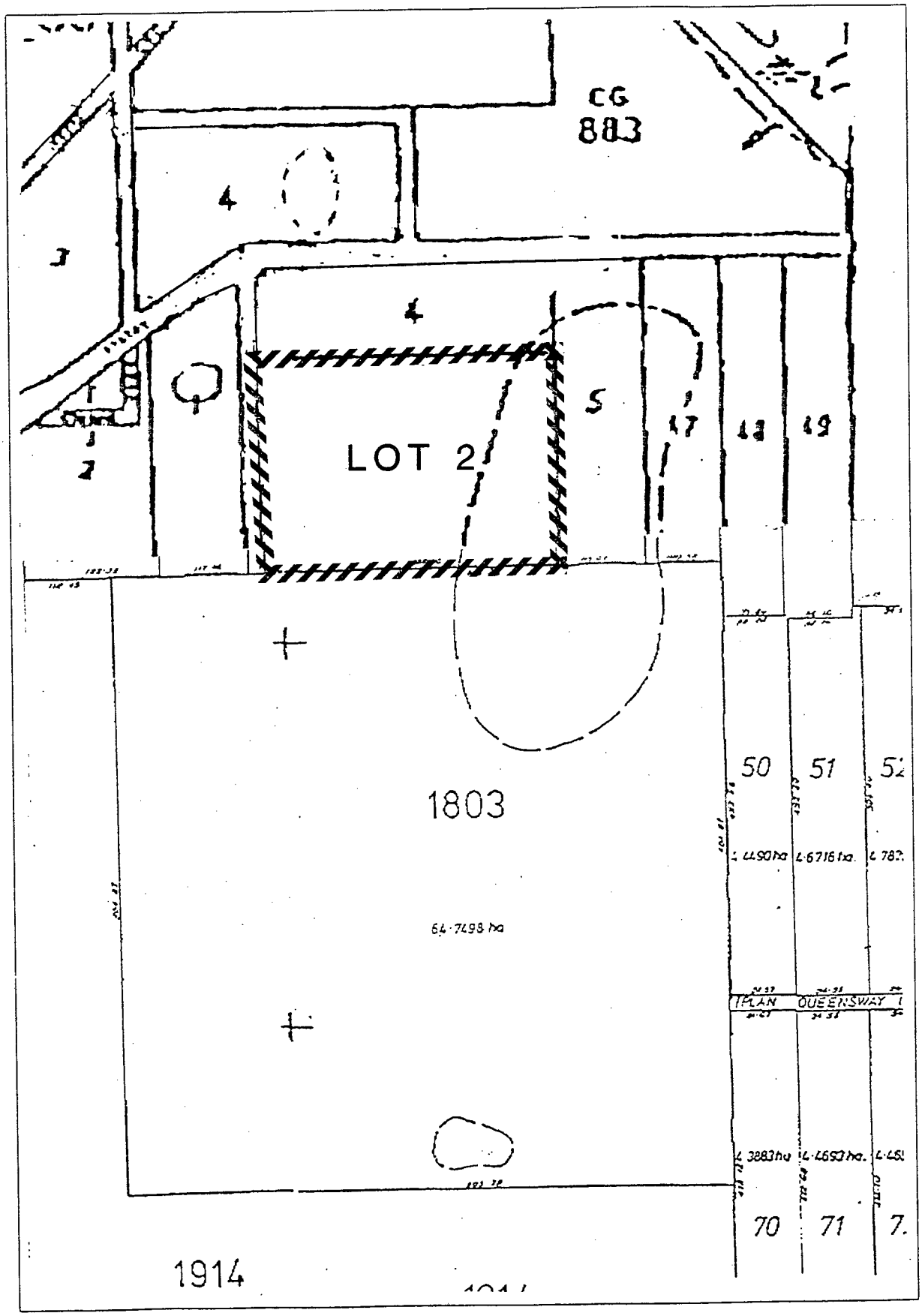
7 Semeniuk, CA (et al). A proposed classification system of wetland vegetation of the Darling System, Journal of the Royal Society WA. 1987.

8 EPA Bulletin 374. A guide to wetland management in Perth. November 1990.

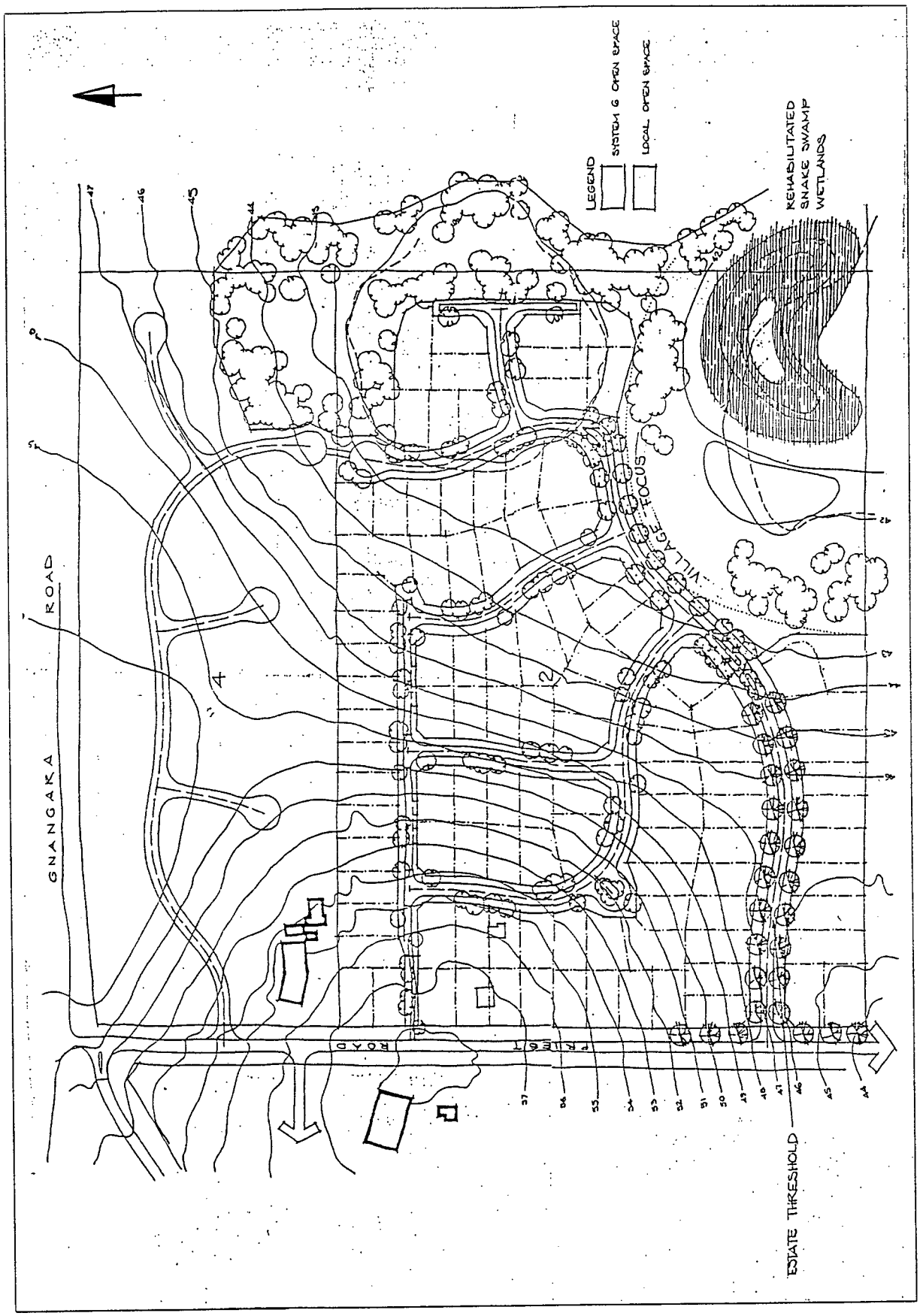
9 Arnold, J. Perth Wetlands Resource Book, EPA Bulletin 266. December 1990.

10 EPA Bulletin 686. A guide to wetland management in the Perth and near Perth Swan Coastal Plain area - an update to EPA Bulletin 374. July 1993.

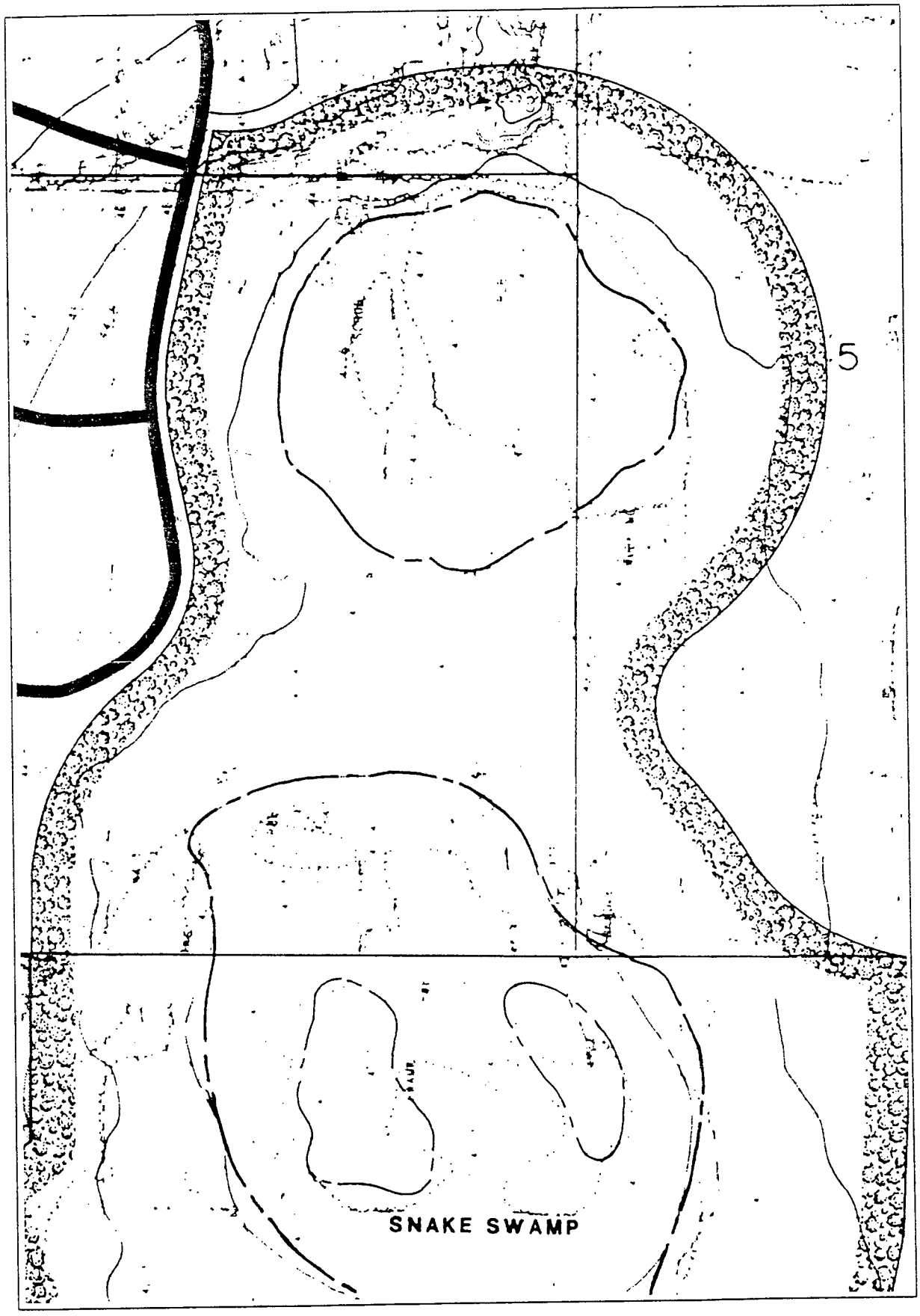
FIGURES



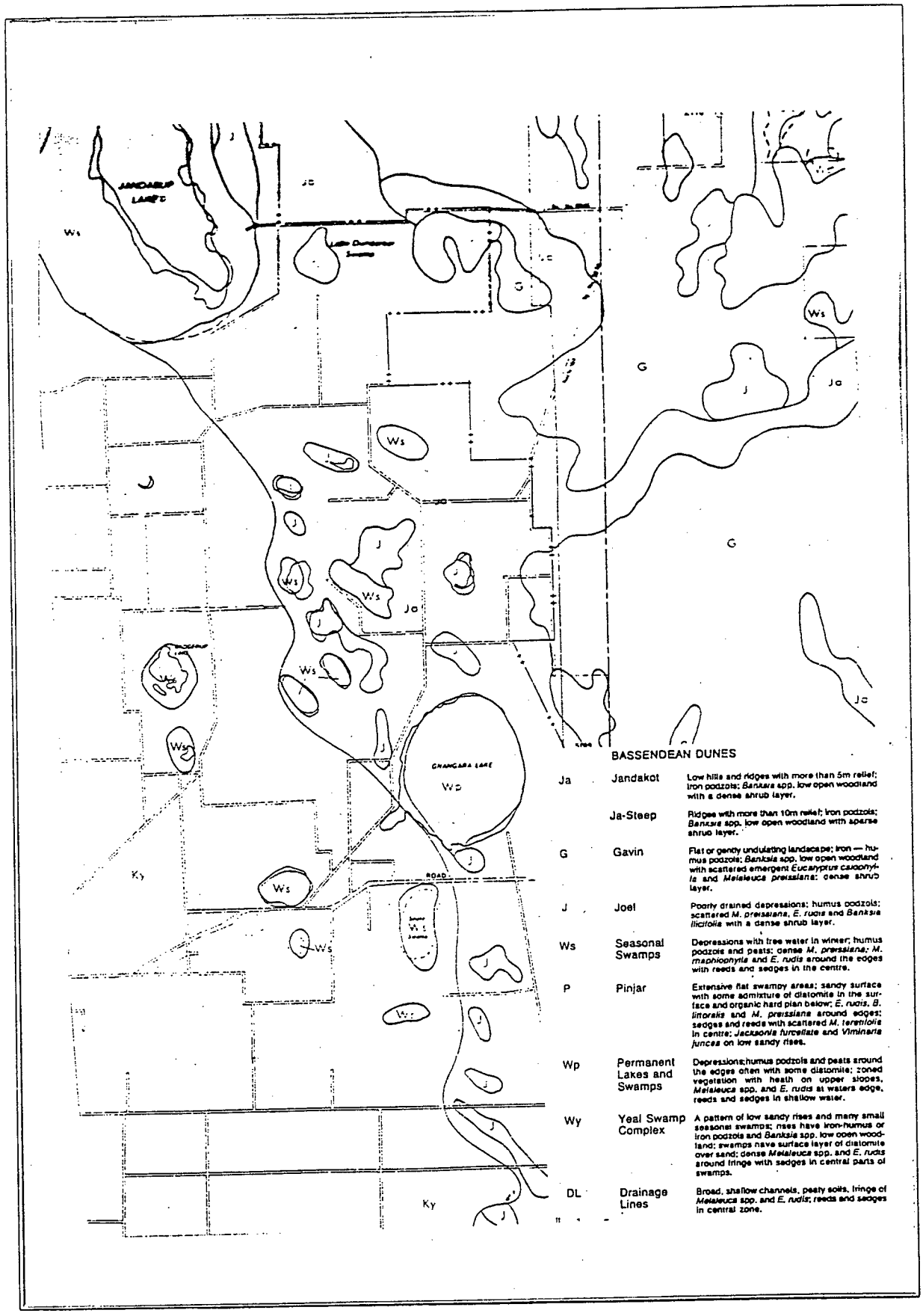
Land Boundaries



Concept Plan

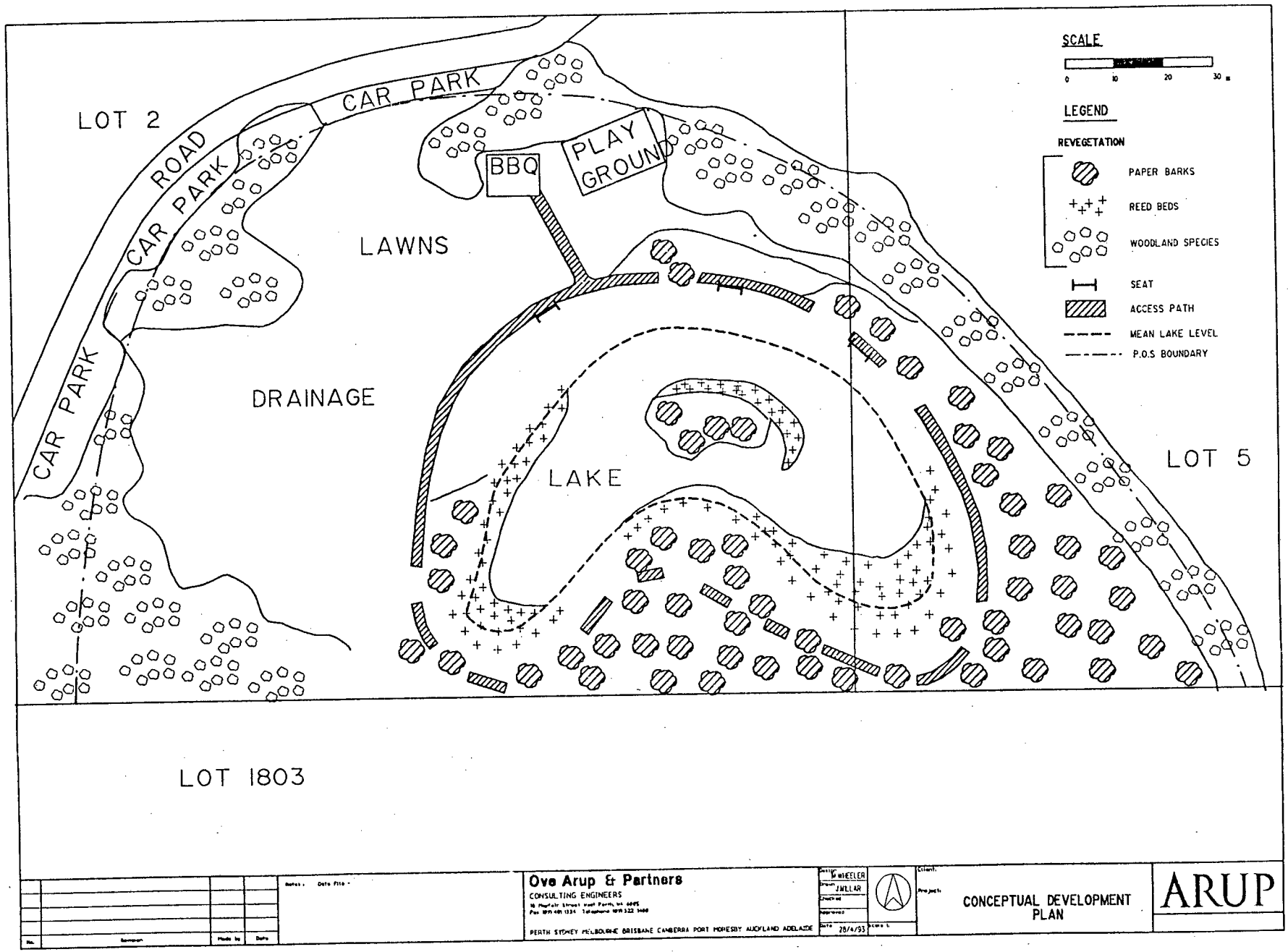


Landsdale Structure plan
Originally approved by EPA



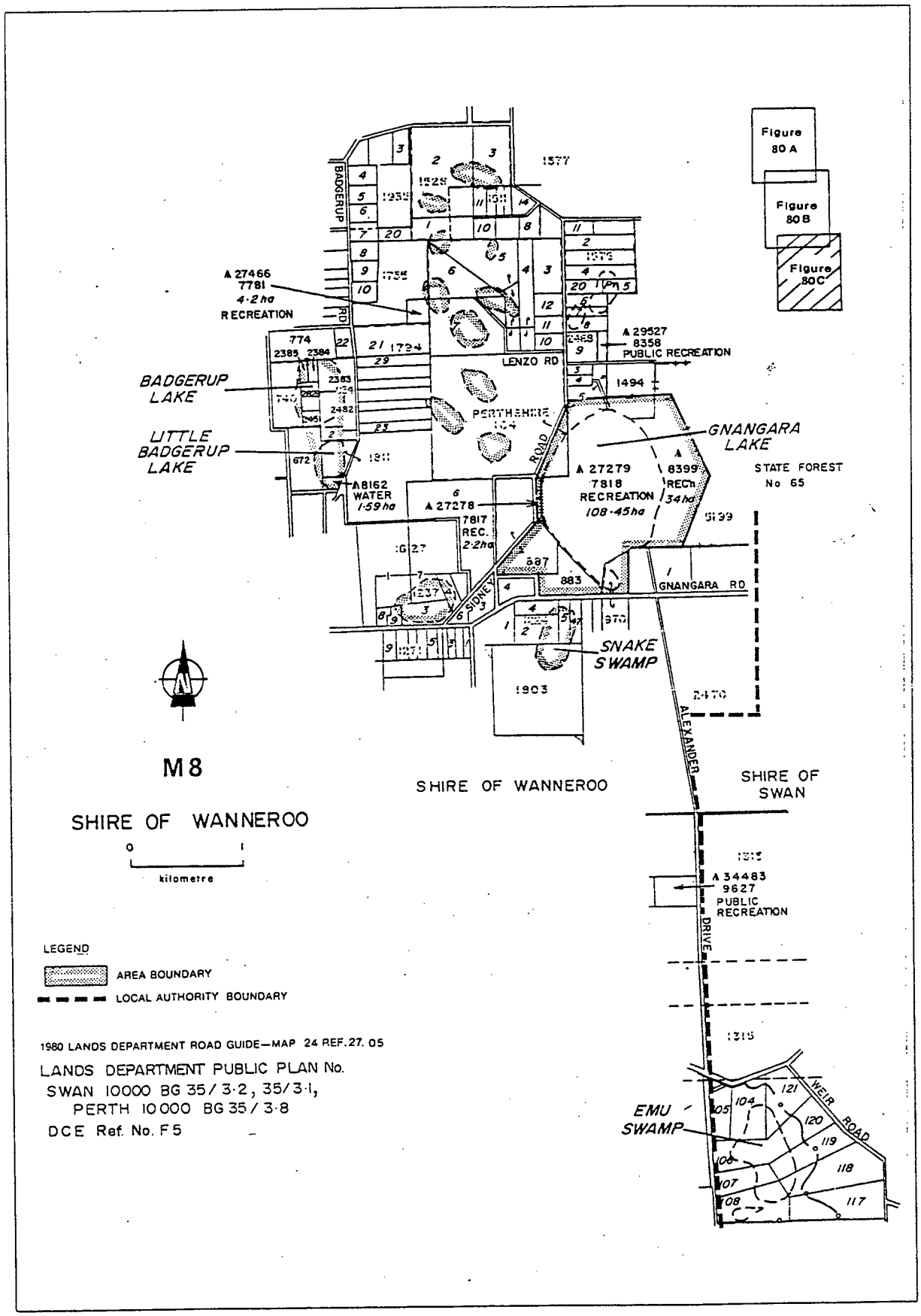
Gnangara Mound landforms, soils and vegetation (WAWA 1986)

Proposed change to System 6/POS boundary
Development concept plan



6

APPENDICES



Part of Wanneroo wetlands
Eastern chain (System 6 Red Book)

APPENDIX A

CONSULTATIVE ENVIRONMENTAL REVIEW GUIDELINES

PROPOSED REZONING AND SUBDIVISION FOR URBAN DEVELOPMENT, LOT 2, LANDSDALE, INCLUDING ALTERATION TO BOUNDARY OF SYSTEM SIX RECOMMENDATION AREA M8, SNAKE SWAMP - SHIRE OF WANNEROO

CONSULTATIVE ENVIRONMENTAL REVIEW

GUIDELINES

Overview

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

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

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

For this proposal, protecting the environment means that the conservation and recreational values associated with the System Six Recommendation Area M8, Snake Swamp are protected. Where they cannot be protected, proposals to mitigate the impacts are required.

Purpose of a CER

The primary function of an CER is to provide the basis for the EPA to provide advice to Government on protecting the environment. An additional function is to communicate clearly with the public so that EPA can obtain informed public comment. As such, environmental impact assessment is quite deliberately a public process. The CER should set out the series of decisions taken to develop this proposal at this place and time and why.

Objectives of the review

The Consultative Environmental Review should have the following objectives:

- to place this project in the context of the planning process and progressive development of the locality affected by System Six Recommendation M8 for Snake Swamp.
- to explain the issues and decisions which led to the choice of this project at this place at this time;
- to set out the environmental impacts that the project may have;
- for each impact, to describe any environmental management steps the proponent believes would avoid, mitigate or ameliorate that impact; and

The CER should focus on the major issues for the area and anticipate the questions that members of the public will raise. Data describing the environment should be directly related to the discussion of the potential impacts of the proposal. Both should then relate directly to the actions proposed to manage those impacts.

Key issues

The critical environmental issue for the proposal is the management and protection of the System Six Recommendation Area M8, Snake Swamp. It is important that the CER shows a detailed understanding of conservation, landscape, and social values in the area, and whether these values are represented elsewhere. The conservation values of areas to be disturbed should be examined in sufficient detail. Any proposals the proponent has with respect to the potential modification of System Six boundaries and enhancement of wetland values should be indicated clearly.

The key issues for this project should be clearly identified and the content of succeeding sections determined by their relevance to these issues.

In this case the key issues should include:

- the rationale for altering the boundary of the System Six Recommendation Area M8 Snake Swamp, and the alternatives considered;
- the conservation, landscape and recreational values and opportunities lost and/or gained through adjustment of the System Six boundary for Snake Swamp;
- the relationship and compatibility between this proposal and those of adjoining landholders with particular reference to the proposed changes to the System Six boundary and the enhancement of the wetland function for Snake Swamp; it is important to discuss how the conservation and recreational values for this proposal would integrate with those of adjoining landowners;
- discussion on how environmental objectives identified for this proposal, such as creating a functional wetland, which includes land not owned by the proponent will be achieved through the planning process.
- discussion regarding the construction of the wetland - including preliminary design parameters, functions, area, revegetation of appropriate wetland and woodland species, timing and environmental goals of the improved wetland (specific details will be required in a subsequent Environmental Management Programme);
- discussion of wetland management issues including who will undertake the work, who will be responsible for on-going funding, management and performance monitoring of the improved wetland;
- preliminary discussion of potential lot sizes and numbers, stormwater drainage management (water quality and quantity management), effluent disposal, contribution to Public Open Space, details of other land allocations;

plus any other key issues raised during the preparation of the report.

The provision of detailed maps and plans is highly important, in particular maps of suitable scale which show the present System Six boundary for Snake Swamp including that land not owned by the proponent; a plan indicating the change to the System Six boundary proposed by the proponent including an indication of how this modified boundary will integrate with or could influence the System Six boundary on adjoining land not owned by the proponent.

Detailed list of environmental commitments

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

a who will do the work;

b what the work is;

c when the work will be carried out; and

d to whose satisfaction the work will be carried out.

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

APPENDIX B

EXCERPT FROM THE SYSTEM 6 RED BOOK - M8 WANNEROO WETLANDS - EASTERN CHAIN

M8 WANNEROO WETLANDS — EASTERN CHAIN

The area comprises Reserve C11598, for Recreation, vested in the Shire of Wanneroo; Locations 1640, 1653, 1747, 1804, 1896, 1897, 1963 to 1981, 2493, 2494, 2694, 2696 to 2698, 2702, 2703, 2923, 4135, 5454, 5455, part of Locations 2692 and 2928, lots 1, 3 to 7 of Location 1678, lots 1 and 3 of Location 1852, lots 2, 50 and 51 of Location 4134 **(Lake Pinjar)**; part of Reserve C36496, for Public Recreation, not vested; lots 48 and 49 of Location 1540 **(Lake Adams)**; part of Locations 1481, 1581, 1582, 1673, 1734, 2316, 3144, 3191 and 5373 **(swamps south and east of Lake Adams)**; part of lots 1 to 7, 38 and 39 (Location 1816), part of lots 1 and 2 (Location 8), part of lots 9 to 11 (Location 2081), part of Locations 1133, 1395, 1646, 1658, 1818, privately owned freehold land; and a foreshore reserve which is Crown land **(Mariginiup Lake and Little Mariginiup Lake)**; part of Locations 1734, 1787 and 1856 **(wetlands north of Jandabup Lake)**; Reserves C7349, for Conservation of Fauna, vested in the Minister for Fisheries and Wildlife; C33193, for Public Recreation, vested in the Shire of Wanneroo; part of Reserve C15054, for Public Utility, not vested; part of lots 1 to 10 (Location 1654), part of lots 11 to 14 (Location 1686), part of lot 30 (Location 1635), part of lot 17 (Location 1935), part of Locations 1383, 1504, 1655, 1713, 1787, 3310 and 5205, privately owned freehold land **(Jandabup Lake)**; part of Locations 672, 740, 774, 934, 1811, 2383 to 2385, 2451, 2482 and 2829; and Reserve C8162, for Water, under the control of the Shire of Wanneroo **(Badgerup Lake and Little Badgerup Lake)**; part of Reserve C27466, for Recreation, vested in the Shire of Wanneroo; part of lots 1 to 3 (Location 1526), part of lots 11 to 13 (Location 1511), part of lots 24 and 25 (Location 1794), part of lots 5 to 7 (Perthshire Location 104), part of Perthshire Location 104, and part of Location 1735 **(wetlands near Lenzo Road)**; part of lots 2, 4 and 5 (Location 1224), part of lot 47 (Location 2470) and part of Location 1803 **(Snake Swamp)**; Reserves C8399, C27278 and C27279, all for Recreation, vested in the Shire of Wanneroo; part of Perthshire Location 104, part of lot 5 (Location 2488), Location 883 and part of Locations 887, 970 and 1494, privately owned freehold land **(Gnangara Lake)**; part of lots 1, 3, 4, 7 and 9 (Location 1237) **(wetland south-west of Gnangara Lake).**

The area comprises a chain of wetlands about 24 km long, which passes a few kilometres east of Wanneroo (Figures 84A, 84B and 84C). Emu Swamp has been 'reserved' and other land in the area has been recommended for possible 'reserves' for Parks and Recreation under the Metropolitan Region Scheme.

Several concepts discussed in Chapter 5 are relevant: 'regional parks', 'pathway systems' and 'conservation buffer zones'. The last concept would be most applicable where adjacent privately held land is adversely affecting a lake's conservation value.

Lake Pinjar

Almost all of this lake (see Figure 84A) is privately owned. Major modifications have been made to the shoreline and littoral zone. The remnants of the original vegetation include jarrah, marri, pricklybark, banksia, sheoak, Christmas tree and blackboy on higher ground, and flooded gum and paperbark close to the water. Reservation of a strip of land across Lake Pinjar may be a valuable way of representing the interesting sand dune formations, named lunettes, which occur in the area.

Lake Adams

The original extent of the lake (see Figure 84B) is indicated by a few scattered remnants of the fringing flooded gums. A fall in water level has been aggravated by groundwater extraction and the pine plantation to the north. The owners have undertaken a project to increase the lake's value as a landscape feature and a summer refuge for water-birds, by clearing some reed beds, to provide open water.

A section of the area surrounding the lake (Reserve C36496) is used for equestrian trails and the Wanneroo Shire Council plans to set aside the western part (lot 49) for conservation.

Swamps south and east of Lake Adams

These swamps are located in freehold land and are subject to seasonal inundation. Surrounding vegetation has been substantially cleared and although the area is dissected by tracks no agricultural use is apparent at present. The swamps may attract water-fowl when inundated.

Mariginiup Lake and Little Mariginiup Lake

Mariginiup Lake is a semi-permanent fresh water lake. It is fringed with sedgelands of jointed twig rush, *Baumea juncea* and *Eleocharis sphacelata*, and the surrounding vegetation includes the shrub *Leptospermum ellipticum* and patches of flooded gum and swamp paperbark.

It offers summer refuge for water-birds, including teal and pink-eared and black duck. Although the surrounding areas involving small agricultural holdings have been disturbed the lake still has conservation value.

Little Mariginiup Lake is a seasonal swamp with reed beds in the western half and market gardens to the east. It is surrounded by cleared land which is freehold.

Wetlands north of Jandabup Lake

The wetlands contain open water with emergent reeds. The southern lake has a smaller reed zone. Most of the surrounding area has been cleared but the lakes provide nesting and feeding areas for the birds at certain times of the year.

Jandabup Lake

Jandabup Lake is the largest body of open fresh water in the Shire of Wanneroo and is an important drought refuge for water-birds. The lake supports a variety of dabbling and wading species, including white ibis and black duck. The fringing vegetation, which includes extensive reed beds, sedgelands and remnant flooded gum and swamp paperbark, extends into freehold land. The eastern side of the lake is seasonally inundated and is used for intensive horticulture; the western side is subject to seasonal flooding and has mostly been cleared. Four plant communities occur here which are inadequately represented elsewhere.

Almost all of this lake is privately owned. Major modifications have been made to the shoreline and littoral zone. In April 1978 a large, deep channel was dredged in the south-eastern littoral area. The W.A. Museum has recommended that more of the littoral area be acquired and managed to provide varying water depths and habitats for wildlife.

There are MWB groundwater bores and Forests Department pine plantations to the east of the lake. Some horticulture takes place on the lake margins, and areas on the north-east and north-west have recently been subdivided for hobby farms.

While water extraction for public use is carefully monitored, there is some concern that increasing private use of groundwater may affect the lake.

Badgerup Lake and Little Badgerup Lake

Badgerup Lake and Little Badgerup Lake (see Figure 84C) contain extensive beds of bulrush, and two exotic water plants: water hyacinth and *Polygonum attenuatum*. There are large areas of the native sedge *Scirpus prolifer* in Badgerup Lake and a good stand of swamp paperbark at the southern end of Little Badgerup Lake. Trees have been almost entirely lost from the foreshores and fringes of Badgerup Lake. This area provides a relatively undisturbed breeding habitat for water-birds.

The conservation value of the lakes has diminished following the establishment of exotic species of water-plants, but the lakes could be used as a feature within parkland, compatible with conservation of flora and fauna.

Wetlands near Lenzo Road

These semi-permanent wetlands lie in a wide area of low sandy hills. Extensive grazing and market gardening have reduced the natural vegetation to a few trees around the fringes of the semi-permanent and seasonal swamps, which serve as water-bird refuges.

The wetlands have potential for parkland development, in conjunction with rural use of the surrounding land.

Snake Swamp

Snake Swamp is the largest of several seasonal swamps and winter-wet depressions south of Gnangara Road. The area has been intensively grazed, and the surrounding woodland is very disturbed. If permanent water is maintained by pumping or deepening, the swamp could contribute to the landscape of a recreational area.

Gnangara Lake

Gnangara Lake is a large open fresh water lake which has permanent water except in periods of drought. There has been considerable modification of the foreshore and the lake has been partly developed to cater for active recreation. Part of the eastern foreshore retains its natural vegetation of eucalypt, acacia and banksia. Sedges are found in the northern and southern portions of the lake. There is an area of mudflats exposed for part of the year which supports some species of water-birds. The fringing vegetation, which is in good condition, should be included in the existing reserve and managed for conservation of flora and fauna and recreation.

Wetland south-west of Gnangara Lake

The wetland is a small area of open water, partly bounded by sedges. The water is sufficiently deep to support dabbling water-birds, including black duck.

With the exception of Lake Pinjar, Mariginiup Lake and part of Little Mariginiup Lake, the area is

within the Wanneroo Groundwater Pollution Control Area. The lakes may be affected by organic pollution due to drainage from surrounding septic tanks. The MWB is investigating this. Private and MWB groundwater extraction and forestry activities are likely to affect lake levels and the area may be affected in the future by sewerage and drainage works. Various mineral claims affect the area, which has potential for extraction of diatomaceous earth, peat and sand. Mineral claims affect Lake Jandabup, Little Badgerup Lake, Lake Mariginiup and Gnangara Lake. Mining in part of Gnangara Lake has been approved by the Mines Department. Deepening of the lake below the water table may increase its conservation value as summer refuge for water-birds.

The Conservation and Land Use Committee proposed that the strategy of multiple vesting for the multiple purposes of conservation and/or recreation, water and mining should be applied to Lakes Badgerup, Gnangara, Jandabup, Little Badgerup, Little Mariginiup and Mariginiup and their margins, and to the wetlands near Lenzo Road.

Recommendations

M8.1 The area within the stippled boundary, shown on Figures 84B and C, should be considered as a potential regional park.

M8.2 The Metropolitan Region Planning Authority should consider 'reserving' those portions not already 'reserved' for Parks and Recreation under the Metropolitan Region Scheme according to the following order of priorities: Jandabup Lake, wetlands north of Jandabup Lake, Mariginiup Lake, Little Mariginiup Lake, Gnangara Lake, wetland south-west of Gnangara Lake, Badgerup Lake and Little Badgerup Lake, wetlands near Lenzo Road, Snake Swamp, Lake Adams, swamps south of Lake Adams, and Lake Pinjar.

M8.3 The Metropolitan Region Planning Authority, in consultation with the Department of Conservation and Environment and local land owners, should define management objectives for the area and seek ways and means of achieving those objectives, either through joint management arrangements or, where necessary, acquisition of freehold land. Consideration should be given to:

(a) conservation of flora and fauna being the priority use for Lakes Jandabup, Mariginiup and Little Mariginiup;

(b) recreation being a priority use for Lake Gnangara;

(c) incorporating Badgerup and Little Badgerup Lakes, Lake Adams, swamps south and east of Lake Adams, wetlands north of Jandabup Lake, wetlands near Lenzo Road, and the wetland south-west of Gnangara Lake as part of parkland, for recreation and as a refuge for water-birds;

(d) controlling exotic water-plants;

(e) the area's potential for water and minerals;

(f) in the case of Lake Gnangara:

(i) controlling access to prevent erosion of the foreshore, by replanning access roads and amenities;

(ii) permitting only passive recreation in areas where fringing vegetation is of high quality;

(iii) encouraging the growth and regeneration of vegetation on the eroded foreshores;

(iv) protecting fringing vegetation from effects of mining, and rehabilitating the lake after mining.

M8.4 Until such time as the regional park concept may be incorporated in legislation, an advisory committee for the area should be set up by the Metropolitan Region Planning Authority to include representatives of appropriate authorities and interested parties.

APPENDIX C

REGIONAL PARK CONCEPT - EXCERPT FROM PART 2 SYSTEM 6 RED BOOK

5.3 Regional Parks

The concept of Regional Open Space introduced to Western Australia by Stephenson and Hepburn in 1955[18] was intended to provide for the protection of open space of regional significance. They gave as examples:

i) ocean beaches
ii) rivers and their foreshores
iii) areas of landscape value
iv) picnic areas, camping grounds, tourist cabin areas etc.
v) nature reservations
vi) central parks (e.g. Kings Park, Bold Park)
vii) zoological gardens
viii) motor parkways (i.e. scenic drive areas)
ix) open country

Planning procedures such as those discussed in Chapter 4 tend to produce concentrations or nodes of open space in the more attractive areas, often connecting along such linear natural features as rivers, foreshores and beaches. The concept clearly involves private as well as public land, with National Parks often forming the core of the major concentrations of open space of regional significance (Figure 1).

There is, of course, a definitional problem of when open space is regional in character, as distinct from a local amenity. If regional, in the sense of attracting users from beyond the locality, then there is a case for external funding, whether through direct government grant or by some form of regional rating system. Whatever the means of funding adopted, there are administrative advantages in the clear recognition of the areas to which they are appropriate and applicable.

Recommendation

15. Areas identified through planning procedures as open space of regional significance should, where appropriate, be designated as Regional Parks.

5.4 Coordination of Management

Management of the system of regional open space involves both conservation and provision for public access, it requires the coordination of the activities of the government agencies and other holders of land affected, and it may call for technical advice and financial assistance to owners and managing agencies which require them. If it affects privately owned land, and our earlier Recommendation 14 suggests that it should, then it implies constraints on development or incentives to ensure compatible management. It could also involve negotiation to provide managed access to private land or provision for passage through it. This is not so revolutionary as it may seem, since the public will inevitably attempt to reach attractive features, especially if in rural areas. Managed access, directed to where it will do least harm, would thus be in the interests of owners as well as the public. Again, there may be a case for financial compensation or assistance to owners in return for the acceptance of constraints or for maintenance made necessary by public use of the land.

There will be thus a variety of tenure, ownership and management agencies in a Regional Park with, in most cases, a substantial proportion of publicly owned land, some of it presently classified as National Park or recreation reserve. It will be necessary to define management objectives for each Regional Park and its component parts, designated for differing primary purposes, taking account of its role in relation to others; leading then to the identification of the most suitable managing agencies for each component, and a recognition of the need for coordination of their activities.

There would appear to be advantages in giving these functions to a body with appropriate expertise and experience on the ground. The National Parks Authority, with its capability in the management of natural areas while permitting use and enjoyment by the public, is immediately indicated.

Recommendation

16. The National Parks Authority should be given the responsibility for coordinating the planning and management of areas identified as Regional Parks, and for the following functions:
    i) the provision of technical and other advice to managing agencies and owners;
    ii) an examination of the present funding and coordination of development programmes.

These changes to the role of the National Parks Authority may require some legislative changes.