

**Proposal to amend part of System Six
boundary M8, lot 2 Snake Swamp, Landsdale**

Oxleigh Holdings Pty Ltd

**Report and recommendations
of the Environmental Protection Authority**

**Environmental Protection Authority
Perth, Western Australia
Bulletin 736
March 1994**

THE PURPOSE OF THIS REPORT

This report contains the Environmental Protection Authority's environmental assessment and recommendations to the Minister for the Environment on the environmental acceptability of the proposal.

Immediately following the release of the report there is a 14-day period when anyone may appeal to the Minister against the Environmental Protection Authority's report.

After the appeal period, and determination of any appeals, the Minister consults with the other relevant ministers and agencies and then issues his decision about whether the proposal may or may not proceed. The Minister also announces the legally binding environmental conditions which might apply to any approval.

APPEALS

If you disagree with any of the contents of the assessment report or recommendations you may appeal in writing to the Minister for the Environment outlining the environmental reasons for your concern and enclosing the appeal fee of \$10.

It is important that you clearly indicate the part of the report you disagree with and the reasons for your concern so that the grounds of your appeal can be properly considered by the Minister for the Environment.

ADDRESS

Hon Minister for the Environment
12th Floor, Dumas House
2 Havelock Street
WEST PERTH WA 6005

CLOSING DATE

Your appeal (with the \$10 fee) must reach the Minister's office no later than 5.00 pm on 14 April 1994

Environmental Impact Assessment (EIA) Process Timelines in weeks

| Date | Timeline commences from receipt of full details of proposal by proponent | Time (weeks) |
|-------------|---|---------------------|
| 22.11.93 | Proponent Document Released for Public Comment | 4 |
| 28.12.93 | Public Comment Period Closed | |
| 19.1.94 | Issues Raised During Public Comment Period Summarised by EPA and Forwarded to the Proponent | 3 |
| 11.3.94 | Proponent response to the issues raised received | 7 |
| 31.3.94 | EPA reported to the Minister for the Environment | 3 |

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Contents

| | Page |
|---|-------------|
| Summary and recommendations | i |
| 1. Introduction | 1 |
| 2. The proposal | 1 |
| 3. Review of public submissions | 1 |
| 4. Planning context | 4 |
| 5. Environmental issues and their management | 4 |
| 5.1 Background information: Wetland protection | 5 |
| 5.1.1 Wetland values and functions | 5 |
| 5.2 System Six recommendations | 7 |
| 5.3 Fauna habitat | 9 |
| 6. Conclusion | 10 |
| 7. Recommended environmental conditions | 10 |
| 8. References | 12 |

Figures

| | |
|---|---|
| 1. Part of Wanneroo wetlands - eastern chain (System Six area M8). | 2 |
| 2. Proposed concept plan showing original Public Open Space boundary. | 3 |

Appendices

| | |
|--|--|
| 1. Proponent's list of environmental management commitments | |
| 2. Summary of public submissions and the proponent's response | |
| 3. List of individuals and organisations who forwarded a submission during the public review of the Consultative Environmental Review document | |

Summary and recommendations

Oxleigh Holdings Pty Ltd proposes to develop part of Lot 2 near the corner of Alexander Drive and Gngangara Road Landsdale for residential purposes. A portion of this Lot known as 'Snake Swamp' was identified in recommendation M8 (Wanneroo Wetlands - Eastern Chain) of the Environmental Protection Authority's System Six report, as being valuable for conservation because of its wetland functions.

The proposal has sought approval to replace a portion of the existing seasonally waterlogged wetland (dampland) with a smaller area of permanent inundation (lake), with additional rehabilitation to improve the habitat values and other wetland functions of this reduced area.

The major issues which were identified through the environmental impact assessment process, including the public submissions received during the public review period, include the following aspects:

- Protection of wetland values and enhancement of wetland functions:
 - the potential for creating a precedent of allowing wetland size to be reduced in exchange for improved functions;
 - appropriate design to ensure the improvement of habitat values and ecological functions of the rehabilitated wetland;
 - the relationship between the portion of Snake Swamp on Lot 2 and the rest of Snake Swamp; and
 - water balance and maintenance of water quality within an urban setting.
- System Six recommendations for conservation of Snake Swamp:
 - the potential for creating precedents of reducing the size of recommended areas;
 - the effect on the Gngangara Regional Park proposal by the Department of Planning and Urban Development; and
- fauna habitat protection and enhancement.

The environmental issues raised by the Environmental Protection Authority and through public submissions, the proponent's response to the issues and the Environmental Protection Authority's assessment of this response are summarised below.

System Six recommendations and protection of wetland values and functions

Snake Swamp has been intensively grazed and consequently the Environmental Protection Authority considers that enhancement of the area's wetland functions could be beneficial. Indeed, the System Six report notes that Snake Swamp and the surrounding woodland has been degraded by past land uses.

Because Snake Swamp is rather degraded and because it is held in private ownership, the reduction in size of the area conserved within Lot 2 for the maintenance of wetland functions is considered by the Environmental Protection Authority, in this particular case, to be a reasonable compromise to facilitate rehabilitation and secure the implementation of the intent of the System Six recommendation. The Environmental Protection Authority expects that rehabilitation of the wetland will provide greater diversity and more area of usable wetland habitat within an area secured for conservation.

The Environmental Protection Authority has previously indicated that wetland rehabilitation should focus on improving the natural functions of wetlands (Environmental Protection Authority, 1992 Bulletin 658). The enhancement of function to the satisfaction of the Minister for the Environment is the key to making this proposal for reducing the area of wetland environmentally acceptable.

The Environmental Protection Authority notes the commitment of Oxleigh Holdings to liaise with North Whitfords Estates in the development of Snake Swamp as an integrated cell of Public Open Space. The Environmental Protection Authority considers that it is essential for the management of Snake Swamp to be coordinated such that its wetland functions are maintained within its urban setting.

The hydrology of Snake Swamp is influenced by land use in the surrounding area. The thinning of pine plantations and the increase in urban residential developments will both lead to an increase in water levels within Snake Swamp. Management of this potential increase in the ground water levels within the area of Snake Swamp and the potential for a substantial increase in the stormwater volumes of the surrounding area will need to be considered in the detailed design for wetland rehabilitation. The proponent should incorporate the principles and management practices known as Water Sensitive Urban Design within the residential component of this subdivision.

Fauna habitat

It has been brought to the attention of the Environmental Protection Authority that Snake Swamp provides habitat for the Quenda, or Southern Brown Bandicoot (*Isoodon obesulus*). The proponent should undertake a study to identify populations of the Quenda (*Isoodon obesulus*) in the affected area of Snake Swamp, and develop and implement strategies for their management within the Environmental Management Programme. This management programme should be developed and implemented prior to commencement of rehabilitation or construction activities for areas of known habitat for the Quenda.

Following consideration of the environmental issues and the proponent's response to these, the Environmental Protection Authority has concluded that the proposal as described is environmentally acceptable subject to the following recommendations.

Recommendation 1

The Environmental Protection Authority has concluded that the proposed rezoning and subdivision for urban development, Lot 2, Landsdale including alteration to the boundary of System Six Recommendation Area M8, Snake Swamp - City of Wanneroo is environmentally acceptable. In reaching this conclusion, the Environmental Protection Authority has identified the main environmental issues as:

- **Protection of wetland values and enhancement of wetland functions;**
- **System Six recommendations for conservation of Snake Swamp; and**
- **fauna habitat protection and enhancement.**

Accordingly, the Environmental Protection Authority recommends that the proposal could proceed subject to the proponent's commitments listed in Appendix 1 and the Environmental Protection Authority's recommended environmental conditions. (Recommended Environmental Conditions are listed in Section 7).

The Environmental Protection Authority acknowledges the proponent's intention to rehabilitate a portion of Snake Swamp with the objective of enhancing its ecological functions and providing an improved recreational setting. The Environmental Protection Authority considers that the proponent should prepare an environmental management programme to detail the proposed rehabilitation and management planned to improve the wetland functions and habitat values of the site. In support of the proponent's commitments the Environmental Protection Authority makes the following recommendation.

Recommendation 2

The Environmental Protection Authority recommends that the proponent prepare a detailed environmental management programme for the rehabilitation and enhancement of wetland functions of that part of Snake Swamp within Lot 2 which has been generally defined for inclusion as Public Open Space. The Environmental Management Programme should include but not be limited to:

- **ecological, hydrological and human use objectives of the replacement wetland, and how these objectives are met through design and management;**
- **detention of stormwater flows and the retention of nutrients, sediments and pollutants outside of the lake area;**
- **detailed design plans, including habitat maps;**
- **detailed biological specifications, including flora and fauna selections and planting configurations;**
- **water balance of the rehabilitated wetland and nutrient retention basins and the incorporation of the design principles and management practices of Water Sensitive Urban Design within the residential portion of the subdivision of Lot 2;**
- **incorporation of the rehabilitated wetland into an integrated cell of Public Open Space for the remainder of Snake Swamp;**
- **definition of completion criteria for determining success of the rehabilitation of habitat and wetland functions; and**
- **monitoring of vegetation, fauna, habitat and water quality parameters over the first two years following completion of subdivision.**

The proponent should prepare and implement this environmental management programme prior to the preliminary approval of subdivision, to the satisfaction of the Environmental Protection Authority. (See Recommended Environmental Condition 3).

There is substantial expertise in the community to assist with the preparation of rehabilitation of wetlands and the implementation of System Six recommendations. The Environmental Protection Authority's Ecoplan volunteers have training in the appropriate methods for implementation and management of areas recommended in the System Six report for conservation.

Recommendation 3

The Environmental Protection Authority recommends that the proponent should consult with the City of Wanneroo and interested members of the public to develop detailed plans for wetland rehabilitation and ongoing management to enhance the functions of the area of Snake Swamp within Lot 2 which is intended to be conserved as Public Open Space under the City of Wanneroo's Town Planning Scheme.

It has been brought to the attention of the Environmental Protection Authority that Snake Swamp provides habitat for the Quenda, or Southern Brown Bandicoot (*Isoodon obesulus*). In support of the proponents commitments the Environmental Protection Authority makes the following recommendation.

Recommendation 4

The Environmental Protection Authority recommends that Oxleigh Holdings prepare and implement an environmental management programme for the Quenda (*Isoodon obesulus*) prior to commencement of rehabilitation or construction activities in areas of known habitat for this species, to the requirements of the Department of Conservation and Land Management. (See Recommended Environmental Condition 4).

1. Introduction

Oxleigh Holdings Pty Ltd proposes to develop part of Lot 2 near the corner of Alexander Drive and Gnangara Road Landsdale, for residential purposes. This impacts on an area which the System Six report recommended for conservation of wetland functions and habitat within the Wanneroo Wetlands East Chain (Environmental Protection Authority, 1983).

The current proposal, amending the accepted structure plan and impacting on some of the System Six area, was referred to the Environmental Protection Authority in May 1993.

Because of the potential for impacts upon the System Six area, the Environmental Protection Authority decided that the proposal should be formally assessed at the level of Consultative Environmental Review. The Environmental Protection Authority issued guidelines in September 1993 for the preparation of the relevant documentation. The Consultative Environmental Review document was released for a four week public comment period which closed on 28 December 1993.

2. The proposal

A portion of Lot 2 known as 'Snake Swamp' was identified in recommendation M8 (Wanneroo Wetlands - Eastern Chain) of the Environmental Protection Authority's System Six report, as being valuable for conservation because of its wetland functions (Figure 1). The proposed urban development and changes to the boundary of the System Six area are shown in Figure 2. The remaining area of the portion of Snake Swamp within Lot 2 will be rehabilitated to provide increased wetland function. The proponent has sought approval to replace a portion of the existing seasonally waterlogged wetland (dampland) with a smaller area of permanent inundation (lake), with additional rehabilitation to improve the habitat values and other wetland functions of this reduced area.

The proponent has made a number of commitments to ensure that rehabilitation of the remaining wetland and buffer area will provide enhanced hydrological, nutrient attenuation and habitat function for indigenous species (Appendix 1). It is intended that the modified wetland and a buffer will be placed within a 'Public Open Space' zone controlled under the City of Wanneroo Town Planning Scheme. A monitoring plan has also been proposed.

3. Review of public submissions

Seven submissions were received during the public review period. The major issues raised in submissions from the public were as follows:

- Concerns regarding creating a precedent for other System Six and wetland areas;
- wetland values and functions;
- water balance and water quality;
- implementation of the System Six recommendations;
- fauna habitat;
- protection of the vegetation in the area next to Snake Swamp;
- effect upon the Gnangara Regional Park proposal; and
- relationship to the whole of Snake Swamp.

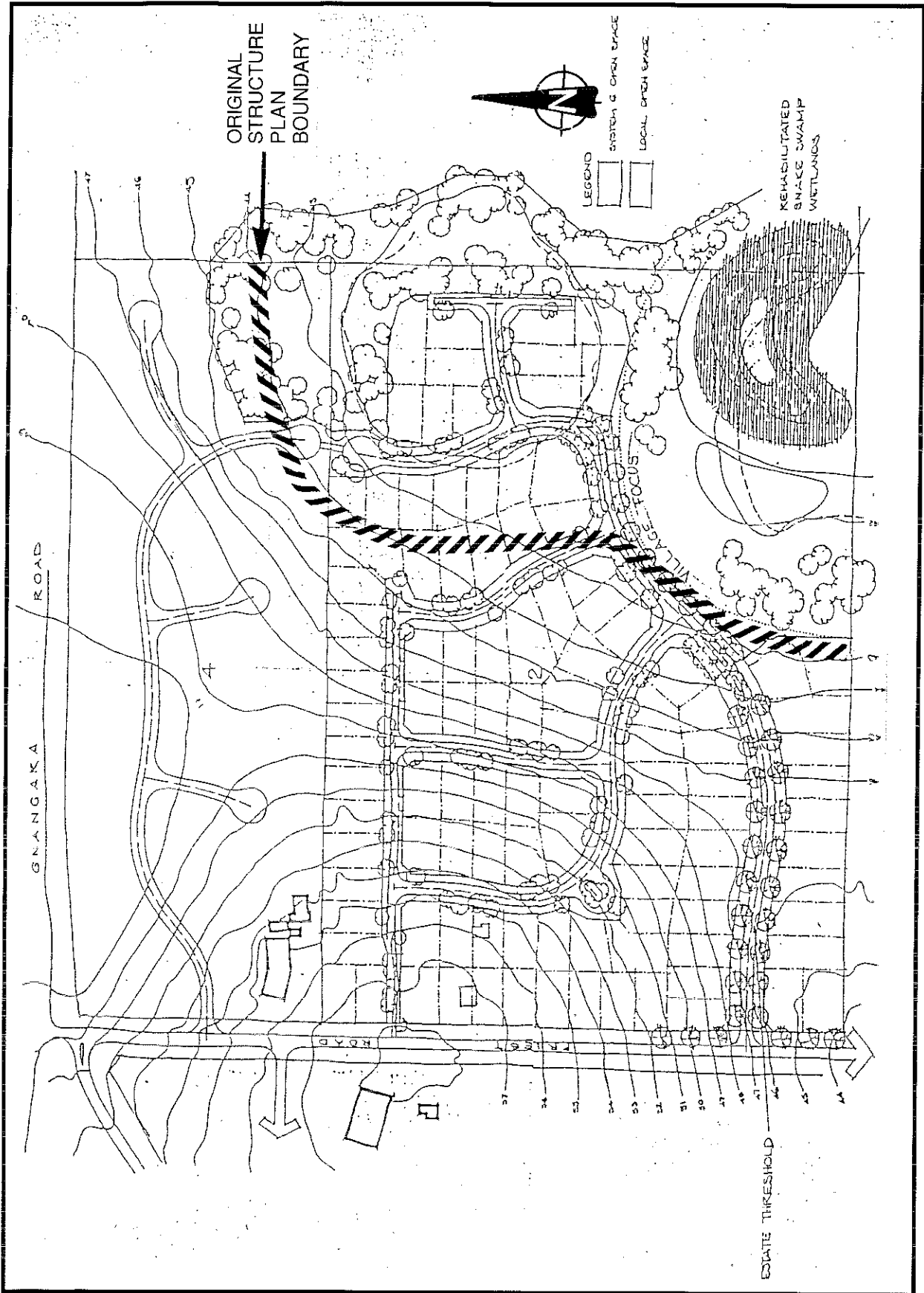


Figure 2. Proposed concept plan showing original Public Open Space boundary.

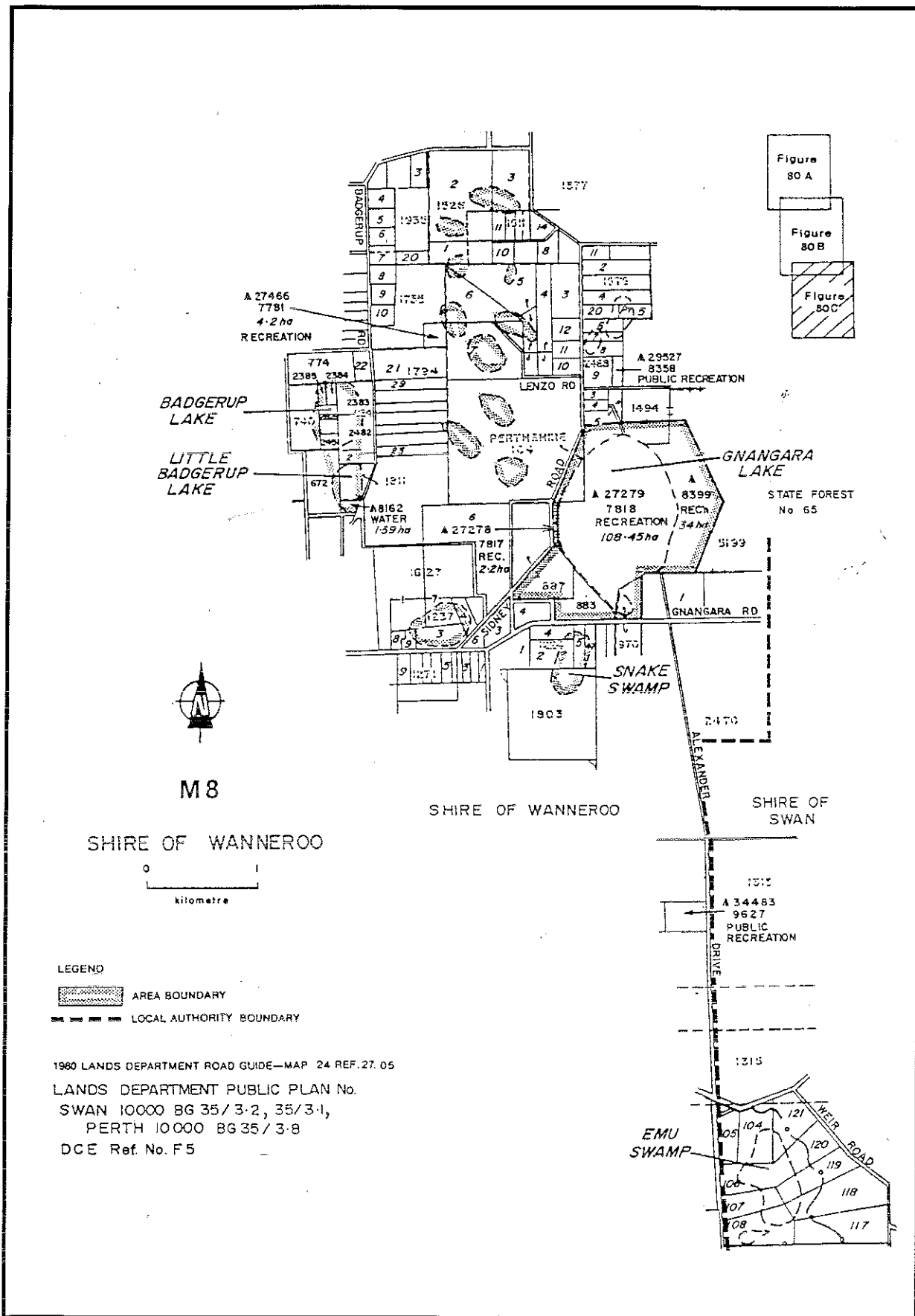


Figure 1. Part of Wanneroo wetlands - eastern chain (System Six area M8).

The Environmental Protection Authority's summarised list of issues raised through the public review phase and the proponent's response to those issues are included in Appendix 2.

The Environmental Protection Authority has included consideration of the submissions received on environmental matters and the response from the proponent within its assessment of this proposal.

4. Planning context

The Environmental Protection Authority's interest in this proposal is limited to the significant regional level environmental impacts which arise from the proposed alteration to the area proposed for conservation in the System Six report. It is the Environmental Protection Authority's expectation that the impacts arising from the clearance of urban bushland should be managed by the proponent in consultation with the Local Government Authority (City of Wanneroo) and the Department of Planning and Urban Development. In addition, this assessment does not include planning preference, which may include environmental aspects, such as risk from surface inundation or flooding during winter months.

Any environmental approval granted through this environmental assessment process does not imply that planning approval will automatically follow.

5. Environmental issues and their management

The major environmental issues related to this proposal which have been identified through the environmental impact assessment process include the following issues:

- Protection of wetland values and enhancement of wetland functions:
 - the potential for creating a precedent of allowing wetland size to be reduced in exchange for improved functions;
 - appropriate design to ensure the improvement of habitat values and ecological functions of the rehabilitated wetland;
 - the relationship between the portion of Snake Swamp on Lot 2 and the rest of Snake Swamp; and
 - water balance and maintenance of water quality within an urban setting.
- System Six recommendations for conservation of Snake Swamp:
 - the potential for creating precedents of reducing the size of recommended areas;
 - the effect on the Gnarara Regional Park proposal by the Department of Planning and Urban Development; and
- fauna habitat protection and enhancement.

Following consideration of these issues and the proponent's response to them, the Environmental Protection Authority has concluded that the proposal as described is environmentally acceptable subject to the recommendations made in this report and the commitments made by the proponent.

Recommendation 1

The Environmental Protection Authority has concluded that the proposed rezoning and subdivision for urban development, Lot 2, Landsdale including alteration to the boundary of System Six Recommendation Area M8, Snake Swamp - City of Wanneroo is environmentally acceptable. In reaching this conclusion, the Environmental Protection Authority has identified the main environmental issues as:

- **Protection of wetland values and enhancement of wetland functions;**

- System Six recommendations for conservation of Snake Swamp; and
- fauna habitat protection and enhancement.

Accordingly, the Environmental Protection Authority recommends that the proposal could proceed subject to the proponent's commitments listed in Appendix 1 and the Environmental Protection Authority's recommended environmental conditions (Recommended Environmental Conditions are listed in Section 7).

5.1 Background information: wetland protection

The Environmental Protection Authority has established a mechanism for evaluating the management objectives of wetlands of the Swan Coastal Plain near Perth (Environmental Protection Authority, 1993 Bulletin 686). Snake Swamp has been evaluated as being within the 'Resource Enhancement' management category (category R) (Water Authority of Western Australia, 1993). The objective for wetlands in this management category is to maintain and enhance the existing ecological functions, and it is acknowledged that opportunities may exist for commercial development to enhance a wetland's conservation values (Environmental Protection Authority, 1993 Bulletin 686). It is also acknowledged that most wetlands in this category have been significantly degraded.

The proponent's intention is to reduce the size of the area of Snake Swamp within Lot 2, but to rehabilitate the remaining portion to improve its human use and natural functions. The resulting wetland will be equivalent to a Conservation and Recreation category (Category 'O' for Open Space) wetland. The management objectives for this wetland category are to provide for human uses whilst maintaining and enhancing the existing natural attributes.

5.1.1 Wetland values and functions

Issue:

The area of Snake Swamp which is covered by this proposal is a seasonally waterlogged wetland, or dampland. The proponent seeks approval to replace a portion of the existing wetland with a smaller area of permanent inundation (lake). Additional rehabilitation to enhance the wetland functions and habitat values of the reduced area is planned in concert with the proposal for urban development.

The proposed urban development is within an area which may be subjected to increased groundwater levels arising from thinning of pine plantations in the catchment and the decreased area of ground water recharge.

Public submissions:

Members of the public criticised the Consultative Environmental Review document because of the claim that '*it is very difficult to justify the existence of a wetland per se at Snake Swamp*' (Ove Arup and Partners Consulting Engineers, 1993). Observations by members of the community included noting the existence of flora (such as *Juncus pallidus*) which is associated with seasonally inundated areas. Furthermore, site visits during December 1993 found surface expressions of water.

A major concern expressed in the public submissions is that accepting this proposal would lead to similar proposals for other wetlands. As a result, it is suggested, many wetlands on the Swan Coastal Plain could become small, deep, artificial lakes, which have very limited ecological value.

Proponent's response:

The proponent has indicated that waterlogging has not been present during any of the consultants visits, although water may be present at some times of the year. However, the

reduction in inundation and ground water levels which has occurred over many years has degraded the overall area to such an extent that it is no longer a viable environmental unit.

In relation to the presence of native vegetation, the consultants have indicated that the Consultative Environmental Review document stated that native vegetation is present, though in highly degraded forms.

EPA's evaluation:

As indicated above, the Environmental Protection Authority noted in the System Six report that Snake Swamp has been intensively grazed and consequently considers that enhancement of the areas wetland functions could be beneficial. The proponent's intentions to rehabilitate a portion of Snake Swamp with the objective of enhancing its ecological functions and providing an improved recreational setting is acknowledged. In this instance it is considered that the loss of some wetland area is offset by the proposed rehabilitation programme and improved wetland function. The Environmental Protection Authority has previously indicated that wetland rehabilitation should focus on improving the natural functions of wetlands (Environmental Protection Authority, 1992 Bulletin 658). In some instances it may be reasonable to accept the loss of wetland area, if wetland functions are improved (Environmental Protection Authority, 1992 Bulletin 658).

However, the Environmental Protection Authority considers that the rehabilitation of the wetland functions should occur in context of an overall plan for the management of Snake Swamp. Oxleigh Holdings should consult with the owners of other portions of Snake Swamp and the City of Wanneroo, to ensure that adequate buffers protect the habitat functions of the wetland. The Authority notes the commitment of Oxleigh Holdings to liaise with North Whitfords Estates in the development of Snake Swamp as an integrated cell of Public Open Space.

The hydrology of Snake Swamp is influenced by land use in the surrounding area. At present the local catchment has substantial pine plantations. As part of managing the impacts of the extraction of groundwater from the Gngangara Mound, these pines will be thinned. It is predicted that the groundwater levels in the area will increase substantially as this operation is carried out (Environmental Protection Authority, 1987 Bulletin 295). In addition, Snake Swamp will be within an area of substantial urban development. It is well known that urban development causes increased run-off of rainfall (Whelans, et al., 1993). Consequently, within the next few years, Snake Swamp may return to a cycle of seasonal waterlogging.

Management of this potential increase in the ground water levels within the area of Snake Swamp and the potential for a substantial increase in the stormwater volumes of the surrounding area will need to be considered in the detailed design for wetland rehabilitation. A significant factor in the reduction in stormwater flows to the wetland area is the design of the residential area itself. The proponent should incorporate the principles and management practices known as Water Sensitive Urban Design within the residential component of this subdivision (Whelans, et al., 1993).

The Environmental Protection Authority considers that the proponent should prepare an environmental management programme to detail the proposed rehabilitation and management planned to improve the wetland functions and habitat values of the site.

Recommendation 2

The Environmental Protection Authority recommends that the proponent prepare a detailed environmental management programme for the rehabilitation and enhancement of wetland functions of that part of Snake Swamp within Lot 2 which has been generally defined for inclusion as Public Open Space. The Environmental Management Programme should include but not be limited to:

- **ecological, hydrological and human use objectives of the replacement wetland, and how these objectives are met through design and management;**

- **detention of stormwater flows and the retention of nutrients, sediments and pollutants outside of the lake area;**
- **detailed design plans, including habitat maps;**
- **detailed biological specifications, including flora and fauna selections and planting configurations;**
- **water balance of the rehabilitated wetland and nutrient retention basins and the incorporation of the design principles and management practices of Water Sensitive Urban Design within the residential portion of the subdivision of Lot 2;**
- **incorporation of the rehabilitated wetland into an integrated cell of Public Open Space for the remainder of Snake Swamp;**
- **definition of completion criteria for determining success of the rehabilitation of habitat and wetland functions; and**
- **monitoring of vegetation, fauna, habitat and water quality parameters over the first two years following completion of subdivision.**

The proponent should prepare and implement this environmental management programme prior to the preliminary approval of subdivision, to the satisfaction of the Environmental Protection Authority. (See Recommended Environmental Condition 3).

5.2 System Six recommendations

Issue:

Lot 2 includes a portion of the wetland known as Snake Swamp which was identified in recommendation M8 of the System Six report. Oxleigh Holdings Pty Ltd intends to reduce the area of the seasonally waterlogged wetland (dampland) which was identified for conservation in the System Six report. The proponent intends to rehabilitate the area with a smaller permanently inundated lake and surrounding areas of seasonal waterlogging or inundation.

Public submissions:

A number of submissions from the public expressed concern over the proposed development because it will reduce the size of the System Six area. A particular concern expressed was that reduction in area as a trade-off for rehabilitation could lead to setting a precedent for other sites recommended for conservation in the System Six report.

Proponent's response:

The Consultative Environmental Review document recognises the potential recreational value of Snake Swamp and proposes that a portion of the area be set aside for public open space within the context of surrounding urban development. The current proposal intends to enhance and conserve about 60 per cent of the area of Lot 2 which was identified in the System Six report. The proponent contends that without this trade-off no rehabilitation is likely to occur and Snake Swamp will continue to deteriorate.

EPA's evaluation:

The Environmental Protection Authority considers that all System Six recommended areas are potentially significant for conservation and carefully scrutinises any development which threatens their values (Environmental Protection Authority, 1993 Bulletin 685). The Snake Swamp area is a portion of a larger area recommended as being of value for incorporation in a Regional Park. The Department of Planning and Urban Development has recently completed a detailed natural resource mapping study of the Eastern Wanneroo wetlands area, most of which are subject to the System Six recommendation M8 (Bowman Bishaw Gorham Environmental Management Consultants, 1994). The natural resources study was intended to identify land

which may be of value to be reserved in the Metropolitan Region Scheme for Parks and Recreation forming the Gngangara Regional Park. The implementation and final form of the proposed Parks and Recreation reservation will be determined by the State Planning Commission and the Minister for Planning.

At present the State Planning Commission is seeking public submissions on a major amendment to the Metropolitan Region Scheme for the East Wanneroo area. A significant portion of the land in this amendment is also subject to System Six recommendation M8 - Wanneroo wetlands, Eastern Chain. A number of the wetlands identified in the M8 recommendation of System Six, which were also identified as being valuable for inclusion in the Gngangara Regional Park, are intended to be reserved for Parks and Recreation under the Metropolitan Region Scheme through the current major amendment process. These include: Lake Gngangara and surrounds; Lake Jandabup and surrounds; Lakes Mariginiup and Little Mariginiup and surrounds; Lakes Badgerup and Little Badgerup and surrounds.

The State Planning Commission has indicated that it is likely, following further more detailed evaluation of the natural resource mapping study, that additional areas will be recommended for reservation by later amendment to the Metropolitan Region Scheme (State Planning Commission, 1994).

In addition, the Environmental Protection Authority expects that the other portions of the System Six M8 recommendation can be managed through the local public open space provisions when local authority scheme amendments are put forward. However, proposals with direct impacts on the System Six areas will be likely to be subject to formal environmental assessment. This current assessment of a portion of Snake Swamp is an example of an occasion where a formal environmental assessment is associated with decisions on allocation of reserves and development zones under the local authority scheme.

It is not known if other wetlands not identified in the System Six report exist in the area. Any such wetlands should be dealt with by the planning agencies in the framework provided by the Environmental Protection Authority's Bulletin 686. Potential indirect impacts on System Six areas or wetlands from development on adjacent land should also be managed through the planning system.

Therefore, the Environmental Protection Authority considers that the environmental assessment of this proposal does not set any precedents for the diminution of System Six nominated areas, because the important wetland values will be protected through the Metropolitan Region Scheme reservation process and implementation of the Gngangara Regional Park. In addition, the Environmental Protection Authority intends to protect the values recommended for conservation in the System Six report for each nominated area through the use of environmental impact assessment where direct impacts are proposed on the values identified for conservation. Each proposal which has the potential to affect System Six recommendations is considered on its own merits against the values identified for recommendation in the System Six report.

In this particular case, as discussed above, the Environmental Protection Authority is aware that Snake Swamp has been intensively grazed and consequently considers that enhancement of the areas wetland functions is desirable. Indeed, the System Six report notes '*Snake Swamp is the largest of several seasonal swamps and winter-wet depressions south of Gngangara 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.*' The report recommended that the area be considered for reservation under the Metropolitan Region Scheme and that it be planned and managed for incorporation into a Regional Park (Environmental Protection Authority, 1983 Report 13).

The Environmental Protection Authority concludes that environmental approval of this proposed development should not be seen as setting a precedent for the destruction of System Six recommended areas, nor the conversion of valued wetland habitats to small deep artificial lakes.

The Environmental Protection Authority understands that members of the public regard the System Six recommendations as providing a guide to ensuring ecosystem representation within

secured conservation reserves. However, because of the rather degraded nature of Snake Swamp and because it is held in private ownership, the reduction in size of the area conserved within Lot 2 for wetland functions is considered, in this particular case, to be a reasonable compromise to facilitate rehabilitation.

The Environmental Protection Authority acknowledges that there is substantial expertise within the community to assist in the development of detailed plans for the enhancement of the values which were identified in the System Six report for conservation. For instance the Department of Environmental Protection's Ecoplan volunteers have training in the methods necessary for assisting in the implementation and management of areas recommended for conservation in the System Six report. It would be valuable for the proponent to consult with the community to develop detailed plans for the rehabilitation and management of the wetland area to be conserved as Public Open Space.

Recommendation 3

The Environmental Protection Authority recommends that the proponent should consult with the City of Wanneroo and interested members of the public to develop detailed plans for wetland rehabilitation and ongoing management to enhance the functions of the area of Snake Swamp within Lot 2 which is intended to be conserved as Public Open Space under the City of Wanneroo's Town Planning Scheme.

5.3 Fauna habitat

Issue:

It has been brought to the attention of the Environmental Protection Authority that Snake Swamp provides habitat for the Quenda, or Southern Brown Bandicoot (*Isoodon obesulus*). Members of the public indicated that the work being done for the biological inventory for the proposed Gnaragar Regional Park had identified that Snake Swamp provided habitat for the Quenda (Bowman Bishaw Gorham Environmental Management Consultants, 1994). The Quenda is gazetted for protection under the *Wildlife Protection Act*.

Proponent's response:

The proponent has acknowledged that Snake Swamp is likely to provide habitat for the Quenda and has made an additional commitment to ensure that rehabilitation work for the wetland area will maintain areas in suitable condition for continued habitation by the Quenda.

EPA's evaluation:

The proponent should undertake a study to identify populations of Quenda in the affected area of Snake Swamp, and develop and implement strategies for their management within the Environmental Management Programme. This management programme should be developed and implemented prior to commencement of rehabilitation or construction activities in areas of known habitat for the Quenda.

Recommendation 4

The Environmental Protection Authority recommends that Oxleigh Holdings prepare and implement an environmental management programme for the Quenda (*Isoodon obesulus*) prior to commencement of rehabilitation or construction activities in areas of known habitat for this species, to the requirements of the Department of Conservation and Land Management. (See Recommended Environmental Condition 4).

6. Conclusion

The Environmental Protection Authority concludes that the proposal can be made environmentally acceptable provided the proponent's commitments and the recommendations of this report are implemented.

The Environmental Protection Authority has established an implementation and auditing system which requires the proponent to advise the Authority on how it would meet the requirements of the environmental conditions and commitments of the project. The proponent would be required to develop a Progress and Compliance report for this project as a section of the recommended audit programmes.

The Environmental Protection Authority's experience is that it is common for details of a proposal to alter through the detailed design and construction phase. In many cases alterations are not environmentally significant or have a positive effect on the environmental performance of the project. The Environmental Protection Authority believes that such non-substantial changes, and especially those which improve environmental performance and protection, should be provided for.

The Environmental Protection Authority believes that any approval for the proposal based on this assessment should be limited to five years. Accordingly, if the proposal has not been substantially commenced within five years of the date of this report, then such approval should lapse. After that time, further consideration of the proposal should occur only following a new referral to the Environmental Protection Authority.

7. Recommended environmental conditions

Based on the assessment of this proposal and recommendations in this report, the Environmental Protection Authority considers that the following Recommended Environmental Conditions are appropriate.

1 Proponent Commitments

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

- 1-1 In implementing the proposal, the proponent shall fulfil the commitments made in the Consultative Environmental Review and in response to issues raised following public submissions provided that the commitments are not inconsistent with the conditions or procedures contained in this statement. These commitments are consolidated in Environmental Protection Authority Bulletin 736 as Appendix 1. (A copy of the commitments is attached.)

2 Implementation

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

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

3 Environmental Management Programme

- 3-1 The proponent shall ensure that the rehabilitation and enhancement of wetland functions of that part of Snake Swamp within Lot 2 which has been generally defined for inclusion as Public Open Space, provides for human uses whilst maintaining and enhancing the existing natural attributes.
- 3-2 To achieve the objective of Condition 3-1, prior to preliminary approval of subdivision and with the benefit of public involvement, the proponent shall prepare an Environmental Management Programme for the rehabilitation of the area of Snake Swamp shown on Figure 1 (attached) to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

This Environmental Management Programme shall include, but not be limited to:

- (1) ecological, hydrological and human use objectives of the replacement wetland, and how these objectives are met through design and management;
 - (2) detention of stormwater flows and the retention of nutrients, sediments and pollutants outside the lake area;
 - (3) detailed design plans, including habitat maps;
 - (4) detailed biological specifications, including flora and fauna selections and landscape design;
 - (5) water balance of the rehabilitated wetland and nutrient retention basins and the incorporation of the design principles and management practices of water sensitive urban design within the residential portion of the subdivision of Lot 2;
 - (6) incorporation of the rehabilitated wetland into an integrated cell of Public Open Space for the remainder of Snake Swamp;
 - (7) definition of completion criteria for determining success of the rehabilitation of habitat and wetland functions; and
 - (8) monitoring of vegetation, fauna, habitat and water quality parameters over the first two years following completion of subdivision.
- 3-3 Prior to the preliminary approval of subdivision, the proponent shall implement the Environmental Management Programme required by Condition 3-2, to the requirements of the Minister for the Environment on advice of the Environmental Protection Authority.

4 Fauna Management

- 4-1 The proponent shall ensure the protection of populations of fauna gazetted under the Wildlife Protection Act which may be impacted by the proposal.
- 4-2 To achieve the objective of Condition 4-1, prior to commencement of rehabilitation or construction activities in areas of known habitat for gazetted rare species, the proponent shall develop strategies for the maintenance of habitat or the relocation of populations of protected fauna (especially the Quenda; *Isoodon obesulus*) which are known to inhabit the wetland, to the requirements of the Minister for the Environment on advice of the Department of Conservation and Land Management.
- 4-3 The proponent shall implement the strategies required by Condition 4-2 to the requirements of the Department of Conservation and Land Management.

5 Proponent

These conditions legally apply to the nominated proponent.

- 5-1 No transfer of ownership, control or management of the project which would give rise to a need for the replacement of the proponent shall take place until the Minister for the Environment has advised the proponent that approval has been given for the nomination

of a replacement proponent. Any request for the exercise of that power of the Minister shall be accompanied by a copy of this statement endorsed with an undertaking by the proposed replacement proponent to carry out the project in accordance with the conditions and procedures set out in the statement.

6 Time Limit on Approval

The environmental approval for the proposal is limited.

- 6-1 If the proponent has not substantially commenced the project within five years of the date of this statement, then the approval to implement the proposal as granted in this statement shall lapse and be void. The Minister for the Environment shall determine any question as to whether the project has been substantially commenced. Any application to extend the period of five years referred to in this condition shall be made before the expiration of that period, to the Minister for the Environment by way of a request for a change in the condition under Section 46 of the Environmental Protection Act. (On expiration of the five year period, further consideration of the proposal can only occur following a new referral to the Environmental Protection Authority.)

7 Compliance Auditing

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

- 7-1 The proponent shall prepare periodic "Progress and Compliance Reports", to help verify the environmental performance of this project, in consultation with the Environmental Protection Authority.

Procedure

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

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

8. References

- Bowman Bishaw Gorham Environmental Management Consultants (1994). East Wanneroo Wetlands. Natural resource mapping study. Department of Planning and Urban Development, Perth, Western Australia.
- Environmental Protection Authority (1983). Conservation Reserves for Western Australia as recommended by the Environmental Protection Authority - 1983. The Darling System - System Six. Part II: Recommendations for Specific Localities. Report 13. Department of Conservation and Environment, Perth, Western Australia.
- Environmental Protection Authority (1987). Gnangara Mound groundwater resources. Water Authority of Western Australia. Report and Recommendations of the Environmental Protection Authority. Bulletin 295. Environmental Protection Authority, Perth, Western Australia.
- Environmental Protection Authority (1992). Relocation of the Cedric Street wetland. Department of Planning and Urban Development, City of Stirling, Westpoint Properties, J K Geneff Nominees, Mr P Baltovich, Fabray Pty Ltd, Mr Furfaro. Report and

- Recommendations of the Environmental Protection Authority. Bulletin 658. Environmental Protection Authority, Perth, Western Australia.
- Environmental Protection Authority (1993). A guide to wetland management in the Perth and near Perth Swan Coastal Plain. Bulletin 686. Environmental Protection Authority, Perth, Western Australia.
- Environmental Protection Authority (1993). Strategy for the protection of lakes and wetlands of the Swan Coastal Plain. Bulletin 685. Environmental Protection Authority, Perth, Western Australia.
- State Planning Commission (1994). Metropolitan Region Scheme Amendment No. 948/33 East Wanneroo City of Wanneroo. State Planning Commission, Perth, Western Australia.
- Ove Arup and Partners Consulting Engineers (1993). Oxleigh Holdings Pty Ltd. Landsdale urban development. Proposal to amend part of 'M8: System Six' boundary. Consultative Environmental Review.
- Water Authority of Western Australia (1993). Detailed wetland and natural resource folios: Wetland management and the conservation estate; Sheet 2034 II NW. Environmental Protection Authority and the Water Authority of Western Australia, Perth, Western Australia.
- Whelans, et al. (1993). Water Sensitive Urban (Residential) Design Guidelines for the Perth Metropolitan Region. Department of Planning and Urban Development, the Water Authority of Western Australia and the Environmental Protection Authority, Perth, Western Australia.

Appendix 1

Proponent's list of environmental management commitments

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.

Arup

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.

Appendix 2

Summary of public submissions and the proponent's response

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

Proponent's reply to submissions

February 1994

7256

Ove Arup & Partners

Consulting Environmental Engineers & Scientists
18 Mayfair Street West Perth WA 6005
Telephone 09-322 1400 Facsimile 09-481 1334

Contents

| | |
|-----------------------------------|---|
| Introduction | i |
| Public submissions | ii |
| City of Wanneroo submission | viii |
| Conclusion | x |
| Figures | 1/1a Generic landscaping arrangement |
| | 2 Proposed concept plan showing original structure plan |
| Appendix | EPA letter |

Introduction

A Consultative Environmental Review (CER) for the proposal to amend part of M8: System 6 boundary was prepared and publicised in the manner approved by EPA in December 1993. This supplementary report has been prepared in response to submissions received by EPA during the review period, and should be read in conjunction with the CER document.

The original submissions, with the exception of the City of Wanneroo submission, were not released by EPA, and this report refers to a summary letter from EPA dated 19 January 1994, a copy of which is appended to this report.

The paragraph numbers and headings used in the above summary letter have been adopted in this report.

Public submissions

1 Wetland values and function

- 1.1 *The hydrological impact on the rest of Snake Swamp as a result of nearby urban development has not been considered.*

The intentions of neighbouring landowners and the possible re-zoning of adjacent land cannot be enforced by Oxleigh Holdings. The effect of changes to adjoining land is controlled by the appropriate Government Authorities at the time of their development.

All owners have of course had the opportunity to comment to EPA on this proposal through the normal processes of the re-zoning application.

- 1.2 *The CER says that the wetland cannot be distinguished from surrounding woodland and does not differ from the adjoining land in its ecological function. This is not the case. The soil in the wetland is waterlogged. It was wet upon inspection in December 1993.*

Waterlogging has not been evident during any of the Consultant's visits. There may be isolated and occasional surface water present; winter and spring 1992 were the wettest in 11 years. However the reduction in inundation and ground water levels which has occurred over many years has degraded the overall area to such an extent that it is no longer a viable environmental unit.

- 1.3 *In contrast to claims made in the CER the vegetation of Snake Swamp is different from the nearby woodland and shows a response to hydrological conditions. Wetland species present include the rush *Juncus pallidus* and the priority listed species *Cartonema philyroides* which occur in the wetland. The flooded gum *Eucalyptus rudis* also fringes part of the southern area.*

As stated in the CER remnants of native vegetation are present, though in highly degraded forms. There is no possibility of these remnants re-establishing themselves to any degree under existing conditions. In fact by far the most significant species below the 42.5m contour is thick stands of non-indigenous Pampas Grass. The enhanced area will provide a suitable environment for a range of native fauna.

- 1.4 *Damplands provide valuable breeding areas for waterbirds. A recent study by CALM showed that over half the breeding occurred in winter wet areas (damplands and sumplands). No information is available in the CER on the breeding opportunities which will be affected if Snake Swamp is modified, as proposed.*

Refer discussion in section 3 below.

- 1.5 *Although Snake Swamp is not gazetted for protection by the EPP Policy, this should not be used as a justification for it being developed. All wetlands have value and the Policy is merely limited to a particular class of wetlands (the lakes) on the basis of political achievability, not on the basis of ecological values.*

The extent and limitation of the EPA's EPP 'Lakes Policy' as released in 1992 is stated clearly in the CER. Snake Swamp receives no protection under the EPP.

Alternative evaluations quoted in the CER concluded that Snake Swamp should be classified as a "dampland".

- 1.6 *The proposal to decrease the size of the wetland by half, and then modify the wetland into an artificial lake does not fulfil the management objectives for a Resource Enhancement wetland. If this was accepted as legitimate, then it would be legitimate to do the same to other wetlands. We would end up with small deep lakes which have very limited ecological value.*

EPA Bulletin 686 quotes resource enhancement category (R) management objectives as "to maintain and enhance the existing ecological functions." It goes on to say that "the term 'resource enhancement' has been used to indicate that opportunities may exist for commercial developments to enhance the conservation values of wetlands (ie the wetland resource) in this category."

This amendment is consistent with the above objectives in that the value of the resource is to be significantly upgraded by the proposal.

- 1.7 *The wetland mapping done by the Semenuik Research Group recognises that Perth is in an extended period of below average rainfall and that a return to average or above average rainfall will cause a rise in wetland water levels.*

The fact that Perth is in an extended period of below average rainfall is clearly recognised in the CER. However there is no certainty when or if this period will come to an end. It is no argument to leave the status quo, that is a degraded and neglected area of minimal environmental or amenity value, awaiting an uncertain future.

- 1.8 *The subdivision and development of the land will affect local hydrology and hence the wetland. This environmental impact and its management has not been adequately addressed. Urbanisation will likely raise the water table and increase surface run-off. In addition, thinning of the Gnangara pine plantation will also cause a rise in the water table.*

The effect of increased runoff from the subdivision has been accounted for in the designs. Implementation of pine thinning will be made in the light of dialogue between CALM and the Water Authority which will address its possible effects, which can be assumed to be matched by the Water Authority increasing drawdown pumping rates accordingly.

Refer section W2.1 for further discussion of this point.

- 1.9 *Given a likely scenario of a rising water table it would be preferable to retain the whole of Snake Swamp. Developing a portion of the wetland could bring future drainage problems, requiring the expenditure of public funds. This would effectively amount to taxpayers subsidising the developer for adverse changes to the local hydrology.*

As stated above, it is disputed that the water table is likely to cause a problem, however the possibility of future drainage problems has been considered. A managed open water body such as that proposed will be a much more reliable means of avoiding or handling drainage problems than leaving the area unmanaged and neglected.

1.10 *There is a lack of detail about the rehabilitation plans for the wetland. How will diverse habitats be provided? Is the lawn area marked "drainage" meant to be seasonally inundated wetland?*

1.11 *The concept plan shows lawn close to and abutting the lake, providing a source of nutrient enrichment for the wetland and being of little habitat value. More extensive planting of local indigenous species including an adequate buffer between lawned areas and the wetland basin should be provided.*

The plans for the rehabilitation and management of the Snake Swamp are necessarily at a concept level at this stage. The details will be developed in conjunction with the appropriate authorities in due course.

Drainage discharge into the proposed lake would be indirect via a shallow basin, overflowing only during extreme events thus protecting the lake from pollutants and accidental spillages. This system has been used extensively and successfully elsewhere.

A generic landscaping arrangement for drainage basins is shown in figures 1 and 1a attached.

2 System 6 recommendations

2.1 *The proposal lacks detail, fails to recognise the importance of damplands and doesn't recognise the function of the site as a bandicoot habitat. Rehabilitation of the area needs to be appropriate to the site and to take into account these values.*

Refer discussion in section 3 below.

2.2 *The suggested approach of the CER is to reduce the conservation area by 48% with a vague promise by the developer that the balance of the area will be rehabilitated. This approach will undermine the core of the conservation estate, ie System 6. The primary motivation is clearly to maximise profits, with no serious consideration of the environmental values of the area.*

This is the core of the CER, ie that the reduction in System 6 area is more than offset in the improved form and function of the Snake Swamp area, from an area of low environmental and amenity value, (eg part rubbish tip), to a managed environmental resource and public amenity.

2.3 *The trade off approach is entirely unsatisfactory. It invariably leads to a reduction in size of the conservation estate, and a reduction in the potential for ecological diversity. It shuts the door on rehabilitation opportunities (as promoted by the EPA's Ecoplan), and creates a precedent for all System 6 areas.*

The Snake Swamp area will further stagnate if development does not occur: There is no potential for ecological diversity in such stagnation.

Each System 6 area is assessed on its own values and this proposal creates no precedent for System 6 areas in general.

- 2.4 *The EPA's Ecoplan programme has shown that with local involvement it is possible to make significant advances in the rehabilitation of degraded areas. If the EPA is going to approve developments in System 6 areas on the basis of them being degraded, a large number of System 6 areas will be lost.*
- 2.5 *The intent of the System 6 recommendation are not being met by this proposal. Rehabilitation of the wetland should include the swamp and surrounding woodland, not a reduction in area. The proposal is really for the "beautification" of what is now a natural area (and could be rehabilitated), merely to enhance property sales.*

The recommendations of System 6 are implemented by Ecoplan. The intent of the System 6 recommendations is that the values are to be defended, not the System 6 areas *per se*. It cannot therefore be argued that protection or otherwise of every System 6 area should have no regard to its own condition. In the case of Snake Swamp there is little useful function which exists or is likely to exist which will not be significantly improved by the proposal presented in the CER.

- 2.6 *Snake Swamp has become degraded and is now a liability to the district, being unsightly, arid and deserted of most of its native flora and fauna. It can only become an asset by being developed artificially as public open space related to residential development.*

Linking the development of the area to residential development will increase the viability of Snake Swamp and secure its future.

3 Faunal habitat

- 3.1 *The report states that there are no wetland fauna habitats present, but no fauna survey of the site is reported and no information is provided on the habitat value of the wetland. However, work done for the Gngangara regional Park study by consultants Bowman, Bishaw and Gorham indicates that the southern brown Bandicoot (*isoodon obesulus*) inhabits Snake Swamp and the area has conservation value as a fauna habitat. There is evidence of bandicoot runs through the vegetation, scratchings and scats. This species is gazetted as rare under the Wildlife Protection Act. CALM should be consulted as to the management requirements for this species.*
- 3.2 *Bandicoots exist in the area at present and they require dense low level vegetation to survive; especially in an urban setting where domestic cats could be expected to be a problem. Existing vegetation on the wetland including pampas grass provides such a habitat. Rehabilitation plans should involve the progressive replacement of weeds with dense indigenous vegetation to ensure bandicoot habitat remains.*

The Bowman, Bishaw and Gorham report (see section 4 below) has not been released for discussion and therefore it is not possible to be objective about this aspect. Particularly relevant would be possible numbers and frequency of appearance of wildlife, which must be irregular as they have not been noted prior to that study.

CALM at their Wildlife Research Centre suggest that the Bandicoot requires dense vegetation and is found especially in areas taken over by introduced species. They are adaptable but replacement of their habitat in an artificial wetland has not

been attempted. As a last resort relocation of any breeding animals can be undertaken.

4 Gngangara Regional Park proposal

4.1 *The 1990 proposal for a Gngangara Regional Park which is being developed through DPUD has not been mentioned in this proposal. How does this proposal relate to the Gngangara Regional Park proposal? Is it consistent with the intended setting aside of conservation areas within that proposal?*

4.2 *A Natural Resource Inventory currently being done for this regional park proposal may provide more detailed information on the flora and fauna of the site.*

From discussion with DPUD, the first stage only (the Bowman, Bishaw and Gorham mapping study) has been undertaken, but the report has not been accepted, nor will there be any public release as yet regarding the proposals.

However it is apparent that the three lake system of Joondalup, Gngangara and Jandabup form the core of the proposal; Snake Swamp is markedly different in character from this area, and there is no plan to include any areas south of Gngangara Road in the proposal.

5 Structure Plans

5.1 *What will happen to the balance of Snake Swamp which is also privately owned? If this proposal is approved, there is little chance of the balance being protected.*

The balance of Snake Swamp is not the subject of this application. Any application by adjoining landowners for the balance of Snake Swamp will need to pass through the same procedures of public and government review as this application. Current proposals for the North Whitfords Estates land to the south incorporate the System 6 land as POS.

5.2 *The Structure Plan showing the whole area as Regional Open Space which was agreed by the EPA should not be changed. A rehabilitation programme for the whole area should be undertaken.*

This paragraph adds nothing new to the argument. The gains from improvement in both form and function have been clearly demonstrated.

6 Other issues

6.1 *With respect to timing (Section 6.3), it is suggested that it would be preferable for the proposed works to be undertaken at the same time as those proposed by North Whitfords Estates.*

The rate of development is subject to normal market conditions, however as stated in the CER, Oxleigh Holdings are committed to developing their POS in full consultation with North Whitfords Estates.

6.2 *The report does not provide any assessment of the Aboriginal significance of the site. Wetlands in the Wanneroo area including Lake Gngangara, have*

been identified as having importance to Aboriginal people. A survey of the area in consultation with Aboriginal people should occur.

An Ethnographic and Archaeological Survey was undertaken in February 1992 on behalf of North Whitfords Estates whose land which includes part of Snake Swamp. Its conclusion was that there are no registered sites on the subject land, and that while Gnangara Lake to the north is considered to be of significant ethnographic importance, no mention is made of Snake Swamp in the relevant literature.

A copy of this survey can be provided to EPA if required.

City of Wanneroo submission

W1 Planning issues

W1.1 *North-East Landsdale Local Structure Plan*

It is the Consultant's belief that the boundary amendment does not conflict with EPA intent for this area.

At the request of EPA a copy of the CER's figure 2 (Concept Plan) is included in this report with the original structure plan boundary overlaid.

W1.2 *POS Allocation*

The figures quoted are an illustration of the generous area of open space available within the proposed subdivision. The portion of Snake Swamp in question will be available not only for "conservation and wetland maintenance" as suggested but also for the enjoyment of the public in general.

W1.3 *POS Management*

Future management responsibilities for the open space created by the proposal will be established in due course. It is not relevant to the determination of this proposal.

W1.4 *Drainage Disposal*

Drainage discharge into the proposed lake would be indirect via a shallow basin, overflowing only during extreme events thus protecting the lake from pollutants and accidental spillages. This system has been used extensively and successfully elsewhere. A generic arrangement of the proposal is attached as figures 1 and 1a.

W1.5 *Adjoining Landholdings*

As previously discussed, Oxleigh Holdings cannot enforce any requirement on land not in their ownership. Development of Snake Swamp by others would be monitored and controlled by approval conditions from Government Authorities in the usual way.

W1.6 *POS Credit*

As stated in the CER, Oxleigh holdings will seek to obtain POS credit from the Local Authority (City of Wanneroo). It is accepted that open water is normally credited on the basis of 50% of its area. Any credit for POS provided above 10% is envisaged to be offset against adjacent subdivisions.

It is accepted that there will be negotiation with the Council on the matter of infrastructure provision in due course, but this is premature at this stage.

W2 Environmental issues

W2.1 *Groundwater/Surface Water Hydrology*

As discussed elsewhere, the site has been dry during all the Consultant's visits. However this is not to say that there may be isolated and occasional surface water

present; winter and spring 1992 were the wettest in 11 years. However the reduction in inundation and ground water levels which has occurred over many years has degraded the overall area to such an extent that it is no longer a viable environmental unit. This is easily confirmed from a site inspection; aerial photographs and hearsay are not sufficient.

Future rises in water levels, and their effect, are difficult to predict. The Water Authority's current modelling does not make allowance for increasing pumping rates and is therefore not a reliable indicator of future ground water levels. Indeed if their results are taken at face value, there will be huge drainage problems throughout the Gngangara region if increased pumping did not take place.

Implementation of pine thinning will be made in the light of dialogue between CALM and the Water Authority which will address its possible effects, and it can be assumed that WAWA drawdown by groundwater extraction will certainly be done in a controlled manner so as to balance the existing regime.

Regarding the proposed subdivision itself, the effect of increased runoff from the subdivision has been accounted for in the designs, and a buffer will be provided around the lake such that all property is protected from the design 1 in 100 year flood in accordance with normal practice.

W2.2

CER Guidelines

Preparation of the CER was in accordance with guidelines received from EPA, and was the subject of extensive discussion with EPA both in concept during development, and in detail during production. It is considered that the information and commitments are presented in sufficient detail for the purpose for which the report is intended, that is to assess a proposal to amend part of M8: System 6 boundary. It is not a detailed development application. This will follow in due course, and the Council will be able to have the appropriate level of detailed input at that time.

Conclusion

- 1 No new arguments have been presented which substantially affect the basic premise of the proposal, that is that the area known as Snake Swamp is seriously and irreversibly degraded in its current form, and that its form and function will be enhanced by the creation of a managed wetland area.
- 2 No significant details have been omitted from the CER or this supplement which are relevant to the current application, that is to amend part of the boundary of the M8: System 6 area known as Snake Swamp.

Figures

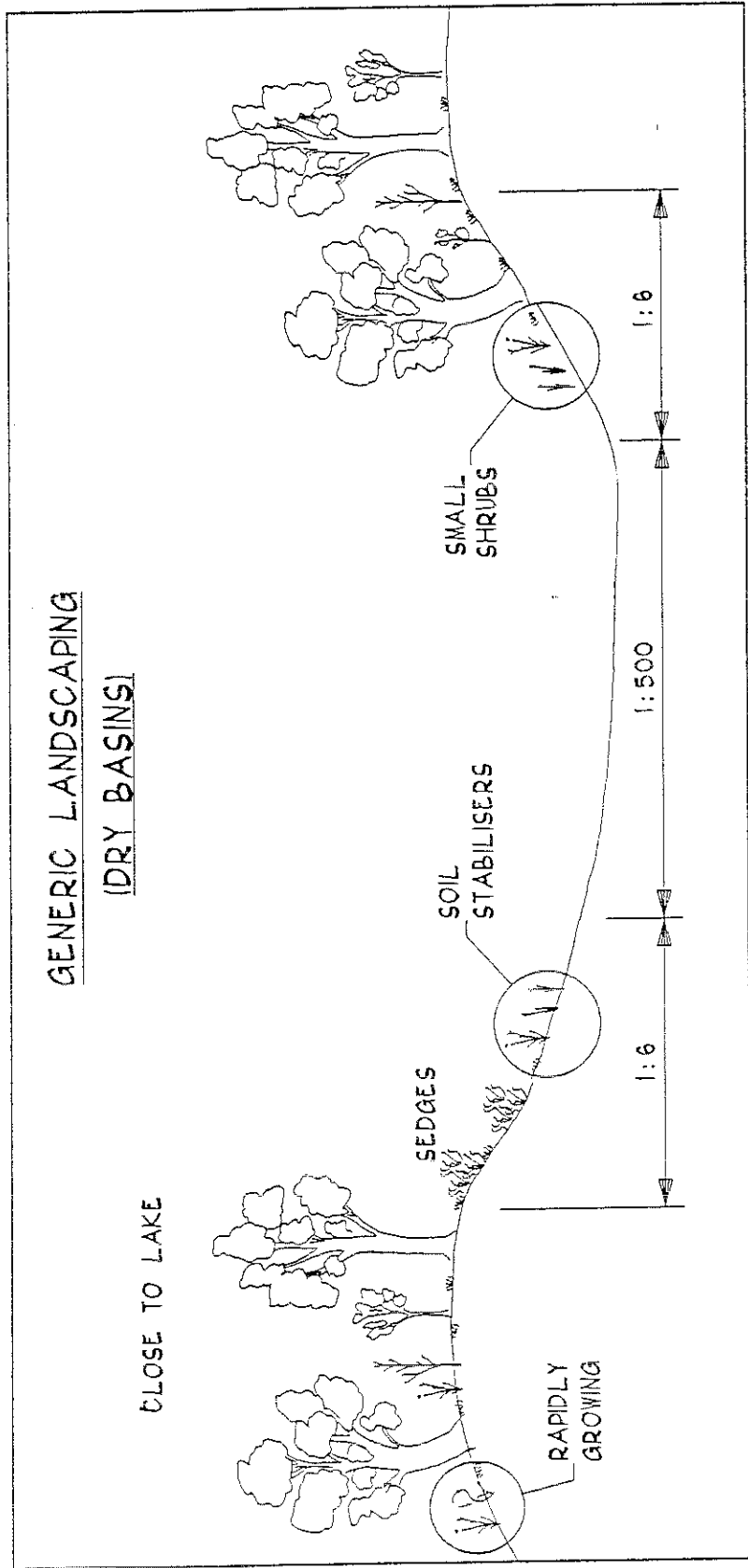


Figure 1: Diagrammatic landscaping arrangement

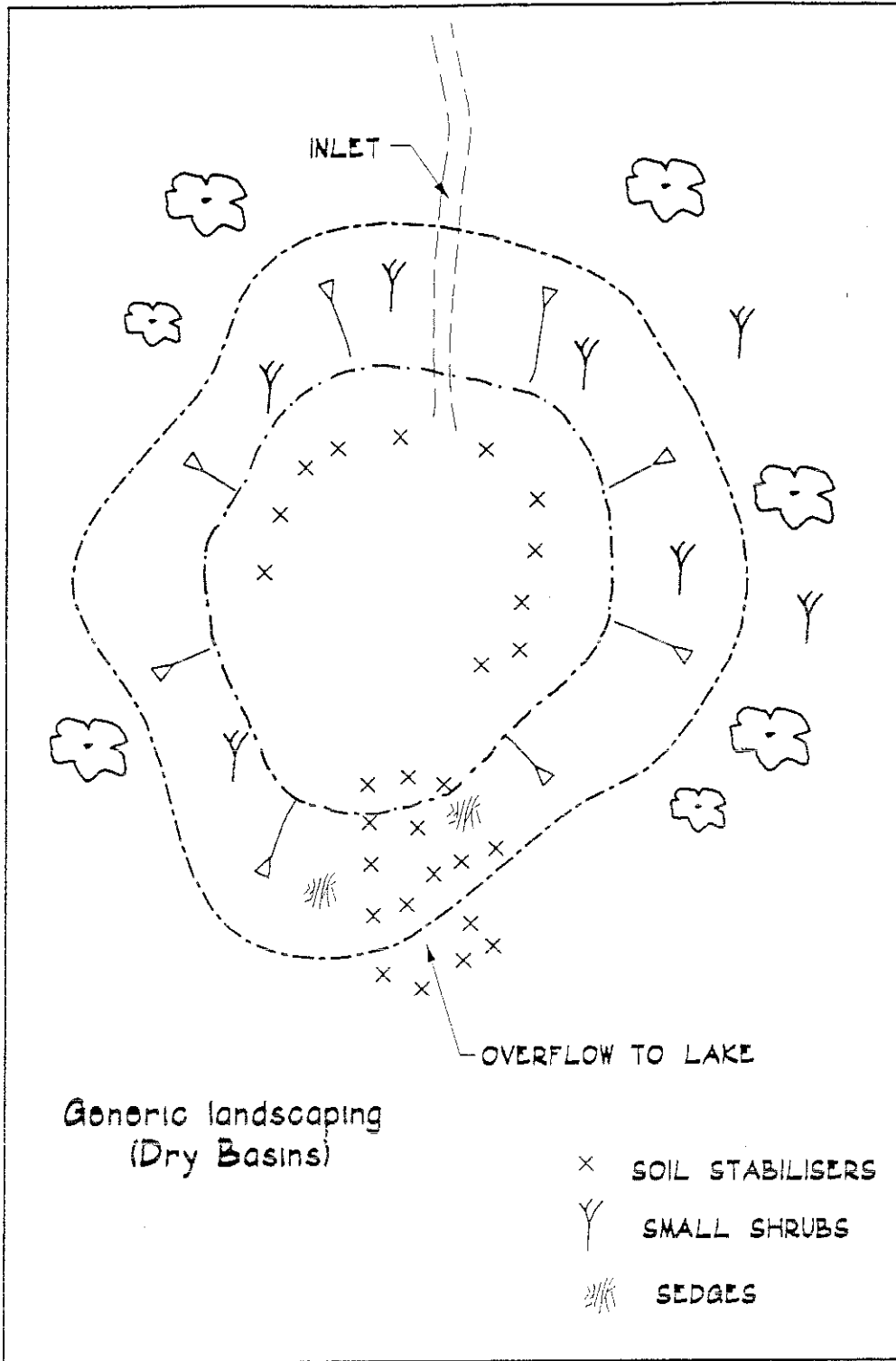


Figure 1a: Diagrammatic landscaping Plan

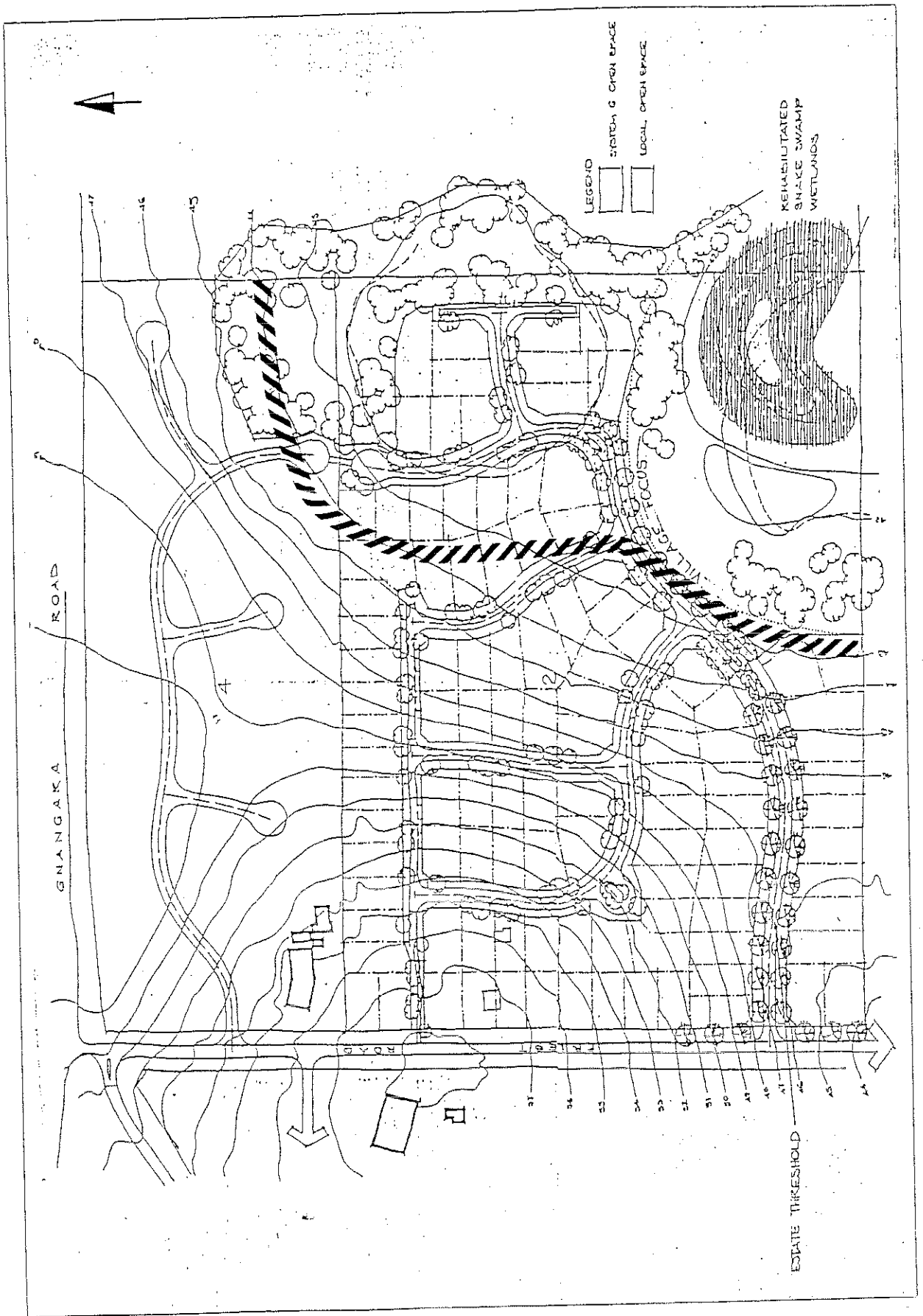
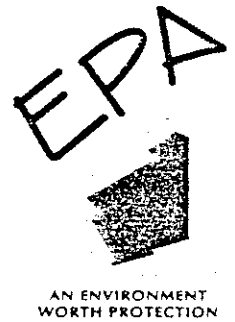


Figure 2: Proposed Concept Plan showing original Structure Plan

Department of Environmental Protection



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| OVE ARUP & PARTNERS | | | | | | PERTH | |
| DATE 25 JAN 1994 | | | | | | FILE 7256 | |
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Director
Ove Arup & Partners
18 Mayfair Street
WEST PERTH WA 6005

Your ref:
Our ref: 120/93
Enquiries: Simon Smalley

ATTENTION: MR ROGER GUTTERIDGE

Dear Sir/Madam

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 (809)

Further to previous discussions on answers to questions raised during the public submission period, please find attached a list of questions for your response.

A copy of these questions and your responses will be appendicised in the Environmental Protection Authority's assessment report. The Authority will, if necessary, include specific comments on issues with potential environmental impacts which are not adequately covered by your response.

Under the Environmental Protection Act 1986, the Authority's report is subject to a 14 day appeal period. During this period the public may appeal the Authority's Report and Recommendations. An incomplete answer to any of the attached questions could cause the public to appeal and this would delay the setting of Ministerial conditions. Accordingly, please ensure that you give a full and reasoned answer to each question.

The general issues of concern in the submissions include:

- Wetland values and functions
- System 6 recommendations
- Faunal habitat
- Gnangara Regional Park proposal
- Structure plans
- Other issues

The City of Wanneroo has prepared a substantial submission which contains a number of questions and comments. This submission has been included as Appendix A. Each issue raised by the City of Wanneroo should also receive a reply.

The Authority looks forward to an early response so that it can finalise its assessment.

Should you have any queries about the attached questions, please contact Simon Smalley on 222 7143.

Yours faithfully



R A D Sippe
DIRECTOR
EVALUATION DIVISION

19 JANUARY 1993

enc

Summary Subs letter 190193 SSm

**Proposed rezoning and subdivision for urban development, Lot
2, Landsdale including alteration to boundary of System Six
Recommendation Area M8, Snake Swamp - City of Wanneroo**

Consultative Environmental Review

Assessment Number 809

A list of concerns and questions has been compiled from submissions received during the period of public comment. The Environmental Protection Authority would appreciate responses to these concerns / questions as soon as possible. This list and the responses from Oxleigh Holdings (or their consultants) will be reproduced in the Authority's report on the project to the Hon Minister for the Environment.

The City of Wanneroo has prepared a substantial submission which contains a number of questions and comments. This submission has been included as Appendix A. Each issue raised by the City of Wanneroo should also receive a reply.

1 Wetland values and functions

- 1.1 The hydrological impact on the rest of Snake Swamp as a result of nearby urban development has not been considered.
- 1.2 The Consultative Environmental Review says that the wetland cannot be distinguished from surrounding woodland and does not differ from the adjoining land in its ecological function. This is not the case. The soil in the wetland is waterlogged. It was wet upon inspection in December 1993.
- 1.3 In contrast to claims made in the Consultative Environmental Review the vegetation of Snake Swamp is different from the nearby woodland and shows a response to hydrological conditions. Wetland species present include the rush *Juncus pallidus* and the priority listed species *Cartonema philydroides* which occur in the wetland. The flooded gum *Eucalyptus rudis* also fringes part of the southern wet area.
- 1.4 Damplands provide valuable breeding areas for waterbirds. A recent study by the Department of Conservation and Land Management showed that over half the breeding occurred in winter wet areas (damplands and sumplands). No information is available in the Consultative Environmental Review on the breeding opportunities which will be affected if Snake Swamp is modified, as proposed.
- 1.5 Although Snake Swamp is not gazetted for protection by the Environmental Protection (Swan Coastal Plain Lakes) Policy 1992, this should not be used as a justification for it being developed. All wetlands have value and the Policy is merely limited to a particular class of wetlands (the lakes) on the basis of political achievability, not on the basis of ecological values.
- 1.6 The proposal to decrease the size of the wetland by half, and then modify the wetland into an artificial lake does not fulfil the management objectives for a Resource Enhancement wetland. If this was accepted as legitimate, then it would be legitimate to do the same to other wetlands. We would end up with small deep artificial lakes which have very limited ecological value.
- 1.7 The wetland mapping done by the Semenuik Research Group recognises that Perth is in an extended period of below average rainfall and that a return to average or above average rainfall will cause a rise in wetland water levels.

- 1.8 The subdivision and development of the land will affect local hydrology and hence the wetland. This environmental impact and its management has not been adequately addressed. Urbanisation will likely raise the water table and increase surface run-off. In addition, thinning of the Gnangara pine plantation will also cause a rise in the water table.
- 1.9 Given a likely scenario of a rising water table it would be preferable to retain the whole of Snake Swamp. Developing a portion of the wetland could bring future drainage problems, requiring the expenditure of public funds. This would effectively amount to taxpayers subsidising the developer for adverse changes to the local hydrology.
- 1.10 There is a lack of detail about the rehabilitation plans for the wetland. How will diverse habitats be provided? Is the lawn area marked 'drainage' meant to be seasonally inundated wetland?
- 1.11 The concept plan shows lawn close to and abutting the lake, providing a source of nutrient enrichment for the wetland and being of little habitat value. More extensive planting of local indigenous species including an adequate buffer between lawned areas and the wetland basin should be provided.

2 System 6 recommendations

- 2.1 The proposal lacks detail, fails to recognise the importance of damplands and doesn't recognise the function of the site as a bandicoot habitat. Rehabilitation of the area need to be appropriate to the site and to take into account these values.
- 2.2 The suggested approach of the Consultative Environmental Review is to reduce the conservation area by 48 %, with a vague promise by the developer that the balance of the area will be rehabilitated. This approach will undermine the core of the conservation estate, *i.e.* System 6. The primary motivation is clearly to maximise profits, with no serious consideration of the environmental values of the area.
- 2.3 The trade off approach is entirely unsatisfactory. It invariably leads to a reduction in size of the conservation estate, and a reduction in the potential for ecological diversity. It shuts the door on rehabilitation opportunities (as promoted by the Environmental Protection Authority's Ecoplan), and creates a precedent for all System 6 areas.
- 2.4 The Environmental Protection Authority's Ecoplan programme has shown that with local involvement it is possible to make significant advances in the rehabilitation of degraded areas. If the Environmental Protection Authority is going to approve developments in System 6 areas on the basis of them being degraded, a large number of System 6 areas will be lost.
- 2.5 The intent of the System 6 recommendations are not being met by this proposal. Rehabilitation of the wetland should include the swamp and surrounding woodland, not a reduction in the area. The proposal is really for the 'beautification' of what is now a natural area (and could be rehabilitated), merely to enhance property sales.
- 2.6 Snake Swamp has become degraded and is now a liability to the district, being unsightly, arid and deserted of most of its native flora and fauna. It can only become an asset by being developed artificially as public open space related to residential development.

3 Faunal habitat

- 3.1 The report states that there are 'no wetland fauna habitats present', but no fauna survey of the site is reported and no information is provided on the habitat value of the wetland. However, work done for the Gngangara Regional Park study by consultants Bowman, Bishaw and Gorham indicates that the southern brown Bandicoot (*Isoodon obesulus*) inhabits Snake Swamp and the area has conservation value as a fauna habitat. There is evidence of bandicoot runs through the vegetation, scratchings and scats. This species is gazetted as rare under the *Wildlife Protection Act*. The Department of Conservation and Land Management should be consulted as to the management requirements for this species.
- 3.2 Bandicoots exist in the area at present and they require dense low level vegetation to survive; especially in an urban setting where domestic cats could be expected to be a problem. Existing vegetation in the wetland including pampas grass provides such a habitat. Rehabilitation plans should involve the progressive replacement of weeds with dense indigenous vegetation to ensure bandicoot habitat remains.

4 Gngangara Regional Park proposal

- 4.1 The 1990 proposal for a Gngangara Regional Park which is being developed through the Department of Planning and Urban Development has not been mentioned in this proposal. How does this proposal relate to the Gngangara Regional Park proposal? Is it consistent with the intended setting aside of conservation areas within that proposal?
- 4.2 A Natural Resource Inventory currently being done for this Regional Park proposal may provide more detailed information on the flora and fauna of the site.

5 Structure Plans

- 5.1 What will happen to the balance of Snake Swamp which is also privately owned? If this proposal is approved, there will be little chance of the balance being protected.
- 5.2 The Structure Plan showing the whole area as Regional Open Space which was agreed to by the Environmental Protection Authority should not be changed. A rehabilitation programme for the whole area should be undertaken.

6 Other Issues

- 6.1 With respect to timing (Section 6.3), it is suggested that it would be preferable for the proposed works to be undertaken at the same time as those proposed by North Whitfords Estate.
- 6.2 The report does not provide any assessment of the Aboriginal significance of the site. Wetlands in the Wanneroo area including Lake Gngangara, have been identified as having importance to Aboriginal people. A survey of the area in consultation with Aboriginal people should occur.

City of Wanneroo



When replying please quote:

OUR REF: 790-594

DATE: 30 December 1993

ADMINISTRATION CENTRE,
BOAS AVENUE,
JOONDALUP
WESTERN AUSTRALIA
TELEPHONE: (09) 405 0333
FACSIMILE: (09) 300 1383

YOUR REF:

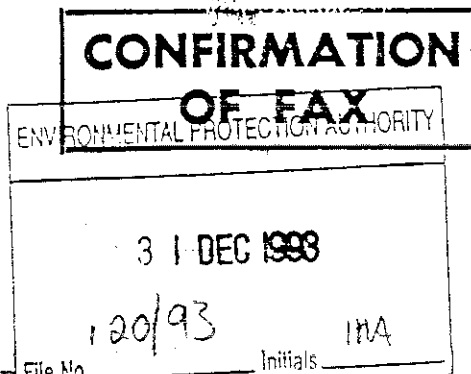
ENQUIRIES: Mr R W Zagwocki
Town Planning

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

Attention: Mr I Harvey

Dear Sir

CONSULTATIVE ENVIRONMENTAL REVIEW (CER) PROPOSED AMENDMENT OF SYSTEM 6 RECOMMENDATION (M8) BOUNDARY SNAKE SWAMP, LANDSDALE



Although the Council of the City of Wanneroo has not formally considered this proposal, it has been assessed at officer level. The proposal has been considered both in terms of its consistency with Council's planning policies for the locality (including the North-East Landsdale Local Structure Plan), and its environmental implications, and the following comments are made.

1. PLANNING ISSUES

1.1. North-East Landsdale Local Structure Plan.

Under the current structure plan, the entire Snake Swamp formation is included in Public Open Space (POS), although the northern extremity of the swamp is identified as being "... subject to future planning and environmental assessment and may be utilised for Residential and Special Residential Purposes." As indicated in the CER, EPA regarded the structure plan as acceptable because "... the area set aside for public open space included all of the System 6 area associated with Snake Swamp."

However, it is unclear whether EPA has specifically accepted the potential exclusion of the northern portion of Snake Swamp from POS, although this is thought not to be the case. This is because EPA's correspondence outlining its position was regarding the structure plan dated November 1991 and at that time the structure plan did not include the qualification applying to the northern portion of Snake Swamp.

72015

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POST OFFICE BOX 21, WANNEROO, WESTERN AUSTRALIA, 6065

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Nevertheless, it has been assumed that the CER has been submitted in accordance with the qualification as indicated in the current structure plan. The CER has thus been assessed from the basis of determining whether it provides sufficient planning and environmental justification for the proposals affecting Snake Swamp.

1.2. POS Allocation

In section 5.2 of the CER it is agreed that notwithstanding deletion of the northern portion of Snake Swamp from POS, the extent of open space proposed exceeds "normal" requirements by over 300%.

However, this argument can be regarded as irrelevant as the normal POS allocation is intended to provide for local recreational needs, whereas the issue with Snake Swamp is one of conservation and wetland maintenance.

1.3. POS Management

The CER contains no specific discussion of ongoing management responsibility for the Snake Swamp POS. Open space established through land subdivision and development is usually managed by Local Government. However, based on its experience with managing wetlands, both natural and modified, the City of Wanneroo may be reluctant to assume responsibility for Snake Swamp, particularly in view of concerns discussed later in this submission.

It is essential that the question of ongoing management responsibility be fully resolved before this proposal is determined, particularly if approval is contemplated. This may need to take the form of a definite commitment by the landowner to reduce the Council's exposure to future capital infrastructure costs.

1.4. Drainage Disposal

The matter of drainage disposal needs to be considered in accordance with the Council's current requirements. To this extent, the Council's Engineering Department would need to consider a detailed proposal (plans) which show how drainage discharge onto the POS (in a soakage basin) is to function.

1.5. Adjoining Landholdings

The CER currently refers to the adjacent landowner, ie Lot 5 and has proposed a concept development plan over this land. It should be noted by the Consultants of the CER that this landholding is not identified as part of the future urban zone and therefore it is doubtful whether this landowner will commit to developing Snake Swamp to a similar level as proposed. Development strategies for the subject land should therefore not apply to the development of Lot 5.

Further recognition should be given to the area of Snake Swamp south of the subject lot and any proposal should be considered as an integrated approach in conjunction with this land. To this extent, an overall development plan is considered necessary for the whole of Snake Swamp.

1.6. POS Credit

The CER incorrectly states (in S.1.3) that the landowner is to receive a POS credit for the entire area of POS from the local authority. Given that the consultants have already suggested that the landowners have provided more than their standard 10% requirement of POS, it is not clear what the consultant means by a credit. It should be recognised that the Council has no intention in acquiring that area of Snake Swamp (particularly the lake areas) for POS as it is not believed this land is essentially being required for recreational purposes. Further, it should also be recognised by the consultant that contributions to other local/regional infrastructure will be required, however, whether or not their 'POS credit will reduce their other obligations within the area has not been resolved, and will require further consideration by Council.

2. ENVIRONMENTAL ISSUES

The entire proposal is premised on the proposition that although the extent of Snake Swamp would be reduced, its function as a wetland would in fact be enhanced. For this proposition to be regarded as acceptable, an adequate understanding of the hydrological and hydrogeological function of Snake Swamp must first be demonstrated.

2.1. Groundwater/Surface Water Hydrology

The proposal as outlined in the CER is totally dismissive of Snake Swamp as a functional wetland. Information presented in Sections 3.5 and 3.6 suggests that the water table is one to two metres below ground level and that the swamp is effectively permanently dry.

However, aerial photography indicates that the central western portion of the wetland is probably wet on a seasonal basis. A recent conversation with a local conservation group member who has inspected Snake Swamp in response to the present proposal also suggests that parts of the swamp formation are wet underfoot.

The effects on groundwater from thinning of the Gngangara pine plantation and groundwater abstraction for public supply are superficially addressed, the overall conclusion being that the water table is unlikely to rise significantly above its current level. As already indicated, even under the current groundwater regime, there are doubts about the conclusions regarding the hydrology of Snake Swamp as presented in the CER.

However, no attention appears to have been given to the groundwater and surface water hydrological implications of land use change in the Landsdale locality. High groundwater using rural uses to the south of Snake Swamp are being progressively displaced by urban development, and such development is proposed in the immediate environs of the swamp. Elevation of the water table and flooding of wetlands are established consequences of such changes in land use, raising further doubts as to the validity of conclusions presented in the CER. Consideration of Water Authority groundwater modelling data is critical in terms of assessing the acceptability of these conclusions.

Based on information presented by the Water Authority to Council's East Wanneroo Working Group and the Gngangara Mound Community Consultative Committee, rising groundwater and wetland water levels is a potential problem in East Wanneroo. The adequacy of open space reservations around wetlands (as a buffer against possible flooding) has been raised as a concern, and obviously needs to be considered in the context of the POS allocation over Snake Swamp.

The material presented in the CER does not demonstrate a thorough understanding of Snake Swamp's function as a wetland, and cannot be regarded as a sufficient assessment of the hydrological and hydrogeological implications of the proposal. The CER is not considered to provide an adequate basis for determining acceptability (or otherwise) of the extent of POS proposed over Snake Swamp and the proposal to subdivide the northern part of the swamp.

2.2. CER Guidelines

In a number of respects, the key issues identified in the CER guidelines provided by EPA have not been adequately canvassed.

Minimal information explaining how the proposal will integrate with proposals for surrounding areas, and how environmental objectives would be achieved through the planning process (extremely important given that other landowners are involved) is presented in the CER.

There is no commitment regarding preparation of an Environmental Management programme for Snake Swamp and, in fact, beyond the limited discussion of water quality monitoring proposals, wetland management issues have essentially not been addressed.

The commitments provided lack detail and do not indicate who will be responsible for discharging the undertakings given, when those undertakings will be discharged and to whose satisfaction they will be completed.

The information presented in the CER is not considered sufficient to enable favourable conclusions to be drawn about the proposal. There are concerns that groundwater and surface water hydrological issues associated with the proposal have not been adequately canvassed. It would therefore be considered inappropriate to accept the proposal as presented. Unless the proponent can conclusively demonstrate the adequacy of what has been proposed, by presenting additional supporting information, the proposal should either be rejected or substantially modified (to extend the open space buffer over Snake Swamp as a safeguard against rising water levels) and exclude residential development from the actual wetland formation.

Yours faithfully



R F COFFEY
Town Clerk

ph:rwz:gm
ple12254

Appendix 3

List of individuals and organisations who forwarded a submission during the public review of the Consultative Environmental Review document

Department of Planning and Urban Development
Coalition for Wanneroo's Environment
City of Wanneroo
Waterbird Conservation Group Inc
Conservation Council of Western Australia Inc
North Whitfords Estates Pty Ltd
Ms M Priest